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THE LONDON NATURALIST

Journal of the
LONDON NATURAL HISTORY SOCIETY

No. 91 2012

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LONDO Y SOCIETY

The Society welcomes new members, both beginners and experts. Its recording area (the London Area) lies within a 20-mile (32-km) radius of St Paul's Cathedral and here most of its activities take place. Although much covered with bricks and mortar, it is an exciting region with an astonishing variety of flora and fauna. The Society is open to those interested in arachnology, archaeology, botany, conchology, conservation, ecology, entomology, geology, herpetology, mammalogy, ornithology, palaeontology, rambling, and all other aspects of natural history. The Society comprises various sections, but all meetings are open to members without formality.

Publications

The London Naturalist, published annually, contains papers on the natural history and archaeology of the London Area and beyond, including records of plants and animals.

The *London Bird Report,* also published annually, contains the bird records for the London Area for each year, as well as papers on various aspects of ornithology.

Bulletins of news items, including the Society's *Newsletter* are sent to members throughout the year.

Indoor meetings

These are held in most weeks throughout the year, with lectures, discussions, colour slides and films on all aspects of natural history.

Field meetings

Led by experts to visit interesting localities, both within and outside our Area. These excursions are very popular with beginners wishing to increase their knowledge, and enable members to get to know one another.

Library

A large selection of books and journals on most aspects of natural history is available for loan or consultation by members free of charge.

Reading circles

Many important natural history journals are circulated by the Sections at a fraction of the cost of subscribing direct.

SUBSCRIPTIONS

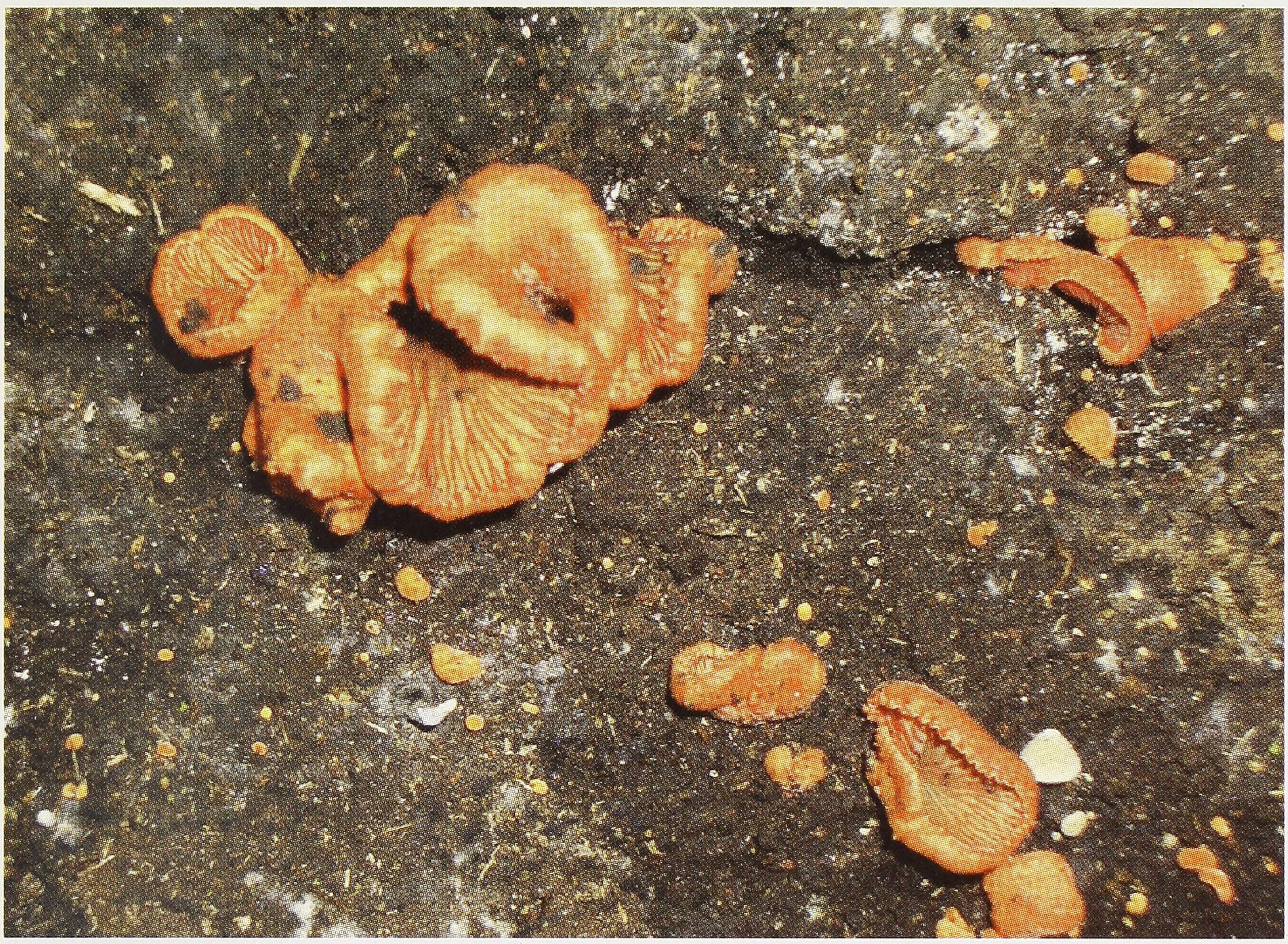
ORDINARY MEMBERS	£20.00
STUDENT MEMBERS	£5.00
SENIOR MEMBERS	£16.00
FAMILY MEMBERS	£4.00
CORPORATE SUBSCRIBERS	£20.00

Student membership is for persons under 18 or receiving full-time education, and senior membership is for persons over 65 who have been continuous members of the Society for ten complete years. All except family members receive one free copy of *The London Naturalist* and the *London Bird Report* each year. Cheques and postal orders, payable to the London Natural History Society, should be addressed to

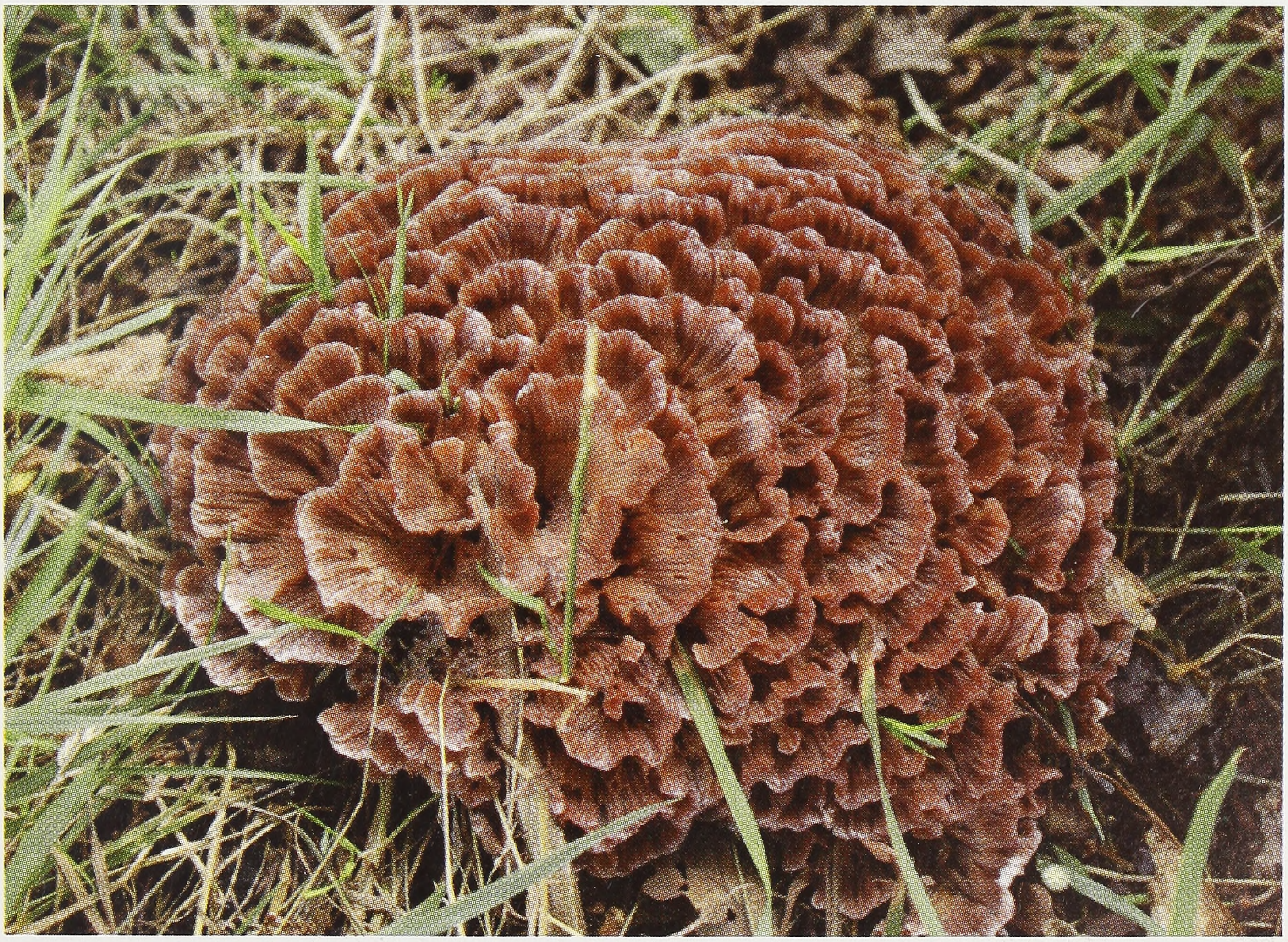
The Assistant Treasurer, LNHS,
Robin Blades,
32 Ashfield Road, London N14 7JY

THE LONDON NATURALIST

Further copies of this issue of *The London Naturalist* may be obtained (price £8 plus £1 postage and packing) from Catherine Schmitt, 4 Falkland Avenue, London N3 1QR. Back numbers of most recent issues of both *The London Naturalist* and *London Bird Report* are also available from the same address. Cheques should be made payable to the London Natural History Society.



Cinnabar oysterling *Crepidotus cinnabarinus,* Alexandra Park, 2003, fourteenth British record.



Zoned rosette *Podoscypha multizonata,* Alexandra Park, 2005.

See page 21.

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Journal of the
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No. 91

for the year 2011

Edited by K. H. Hyatt

Readers are respectfully advised that the publication of material in this journal does not imply that the views and opinions expressed herein are shared by the editor, the London Natural History Society, or any party other than the named author or authors.

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LONDON NATURAL HISTORY SOCIETY

Founded 1858

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17 Bedford Road, London N22 7AU

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Editor, *London Bird Report:* P. Lambert, 109 Gloucester Road, London E17 6AF.

Editor, *Newsletter:* M. Burgess, 92 Fellows Road, London NW3 3JG.

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The Society's Recorders

Botany

Flowering plants and vascular cryptogams: Dr M. Spencer, 72 Michael Cliffe House, Skinner Street, London EC1R 0WX (020-7837 1471).

Fungi: Prof. E. G. D. Tuddenham, 17 Bedford Road, London N22 7AU (020-8374 5167).

Lichens: Vacant.

Bryophytes: P. Howarth, 38a Regina Road, London N4 3PP (07920 143431).

Ecology and Entomology

Mammals: C. Herbert, 67a Ridgeway Avenue, East Barnet, Hertfordshire EN4 8TL (armconservation@hotmail.com).

Reptiles and amphibians: T. E. S. Langton, B.SC., 12 Millfield Lane, London N6 6JD (t.langt@virgin.net).

Fishes: Vacant.

Arachnida: J. E. D. Milner, B.SC., 80 Weston Park, London N8 9TB (acacia@dial.pipex.com).

Coleoptera (Carabidae and Coccinellidae): P. R. Mabbott, B.SC., 49 Endowood Road, Sheffield S7 2LY (paulmabbott@blueyonder.co.uk).

Coleoptera (Lucanidae and Buprestidae): Dr D. S. Hackett, FRES, 3 Bryanstone Road, London N8 8TN (danielhackett@blueyonder.co.uk).

Coleoptera (families not otherwise listed): M. V. L. Barclay, 47 Tynemouth Street, London SW6 2QS (m.barclay@nhm.ac.uk).

Soil-dwelling invertebrates (Myriapoda, Isopoda, Diplura): Andy Keay, 37 Merrymeet, Woodmansterne, Surrey SM7 3HX (andykeay1@aol.com).

Lepidoptera (butterflies): L. R. Williams, 34 Christchurch Avenue, Kenton, Harrow, Middlesex HA3 8NJ (leslie.williams1597@btinternet.com).

Lepidoptera (moths), Syrphidae, and invertebrates not otherwise listed: C. W. Plant, B.SC., FRES, 14 West Road, Bishop's Stortford, Hertfordshire CM23 3QP (cpauk1@ntlworld.com).

Orthoptera: Sarah Barnes, 33 Tavern Close, Carshalton, Surrey SM5 1JE (lnhs.orthoptera@virginmedia.com).

Hymenoptera Aculeata: R. W. J. Uffen, 4 Mardley Avenue, Welwyn, Hertfordshire AL6 0UD (01438 714968, ruffen@talktalk.net).

Hemiptera: T. Bantock, 101 Crouch Hill, London N8 9RD (tristanba@ googlemail.com).

Odonata: Neil Anderson, B.SC., 52 Beechwood Avenue, Greenford, Middlesex UB6 9UB (neil@anders42.freeserve.co.uk).

Plant galls: T. Root, 1 Whitecastle Mansions, Wakemans Hill Avenue, London NW9 0UX (trroot@hotmail.co.uk).

Mollusca: Vacant.

Records may be sent to the appropriate recorder (where shown) or to Colin Plant who will distribute to each recorder the relevant data from a mixed set of records.

Geology

Vacant

Ornithology

Inner London: R. Bonser, Flat 7, 96 Rope Street, London SE16 7TQ (richbonser8181@hotmail.com).

Hertfordshire: Joan Thompson, 73 Raglan Gardens, Watford, Hertfordshire WD19 4LJ (lnhshertsrecorder@jksthompson.plus.com).

Buckinghamshire: A. V. Moon, 46 Highfield Way, Rickmansworth, Hertfordshire WD3 2PR (andrew.moon@talk21.com).

Kent and Lower Thames (London Bridge to Tilbury): J. Archer, 8 Smead Way, London SE13 7GE (john_archer@gofast.co.uk).

Surrey and Upper Thames (London Bridge to Staines): N. Tanner, 11 Collins House, Newby Place, London E14 0AX (nick_tanner@talk21.com).

Middlesex: S. Huggins, 206 East Ferry Road, London E14 3AY (seanhuggins@hotmail.co.uk).

Essex: R. Woodward, 62c High Street, Cheshunt, Hertfordshire EN8 0AH (roy.rkwoodward@ntlworld.com).

Requests for information should be made to the appropriate recorder.

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Report of the Society for the year ending 30 June 2011

Approved at the Annual General Meeting on 7 December 2011

Objectives

The objectives of the Society are the study and recording of natural history, archaeology and other kindred subjects, especially within twenty miles of St Paul's Cathedral, the promotion of scientific investigations, the appreciation and conservation of the natural environment and the publication in the Society's journals of scientific and educational papers. Activities and achievements in respect of these objectives are described below.

Governance: Council, Committees and Sections

The Society is governed by a Council of Trustees, comprising the officers (president, treasurer, secretary), ten representatives of the members at large and one representative of each of the Society's Sections (currently five). Catherine Schmitt represented the Ecology and Entomology Section, David Darrell-Lambert represented the London Bird Club and Ted Tuddenham the Botany Section. Stuart Cole remained as representative for the Bookham Common Survey and Keith Cavanagh as representative for the Hampstead Heath Survey.

Rule 4(c), limiting a continuous period of elected membership to five years, came into force in December 2005 and was first implemented at the AGM in 2010.

The Administration and Finance Committee, chaired by David Howdon, dealt with much delegated business.

Membership

Eighty new members joined during the year, compared with 94 last year. The number of individual members currently stands at 960, compared with 984 at the same time last year, and 1,003 the previous year.

The Society is not just for experts — field meetings are planned with beginners in mind, and newcomers are encouraged to play an active part in the Society's affairs.

We record with regret the deaths of the following members during the year to 30 June (date of joining in brackets): Diana Bradley (1950), Alexa Bright (1976), Ron Payne (1942 honorary vice-president), Marie Smith (1991), John Topp (1978), Alan Wheeler (1950). John Topp left a generous bequest to the Society which will be reflected in next year's accounts.

Finances

The year to 30 June 2011 saw the LNHS seek to make more out of its reserves. They were being held in a cash account and earning interest, which in recent years has been very limited. Council took the view that this ultra-cautious approach to investments was inappropriate given the long-term nature of our organization. Council therefore moved a significant proportion of investments into, still highly cautious, charity bond accounts (based on the underlying assets of corporate and Governmental bonds). Further detail on the Society's finances in the year is contained in the Treasurer's Report and Financial Statements.

Activities

Fieldwork continues for a new flora of the London area to replace Rodney Burton's *Flora of the London Area*. The area for the report will be the LNHS recording area but recording efforts are concentrated on the Greater London Authority area which has not had the same level of recent surveying as the outlying parts of our area. The majority of Botany Section field meetings have been 'flora focused'. Members are encouraged to get out and 'bash a square' or two for this project.

The Ecology and Entomology Section continued to run its well-attended programme of field and indoor meetings covering a diverse group of taxa and developing a group of regular attendees as well as more occasional joiners. This year it also ran a session introducing particularly new entomologists to the maintenance and proper labelling of a collection. The section again represented the Society at the annual exhibitions of the Amateur Entomologists' Society and the British Entomological and Natural History Society.

Under the brand of the London Bird Club the Society has continued to run a series of field meetings showing the diversity of bird life that the LNHS area has to offer. Indoor meetings have continued to prove popular and covered a wider variety of birding topics.

The LNHS made a grant of £200 to fund the RSPB's London House Sparrows project.

Recording and recorders

As mentioned in the previous report, early in this year Nick Tanner took on the role of Surrey bird recorder and Peter Howarth that of Bryophyte recorder.

Mark Pearson has stood down as Middlesex bird recorder, a role now taken on by Sean Huggins.

Thanks go to our outgoing recorders for all their work and a warm welcome is extended to those coming in.

Journals

The London Naturalist **89** (2010) was published in December 2010. *London Bird Report* for 2007 was published and publication of the 2008 and 2009 reports is anticipated in the next report year (indeed the 2008 report had already gone out by the time this annual report was written).

Library

This year saw our long-standing librarian Linda Hewitt stand down from her role (formally on 30 June, the last day covered by this report). Linda was a key player in getting our library up and running in its new home in the Angela Marmont Centre for UK Biodiversity at the NHM's Darwin Centre Phase 2 making it available to the public (for reference) and LNHS members (for borrowing). This report provides a good opportunity to thank Linda for all her work over the years, quietly getting on with managing and organizing this very valuable resource. Her contribution will be greatly missed. David Allen has now been appointed as librarian (although this appointment happened in the year following that covered by this report).

Conservation of the natural environment

Rich habitats are still under threat from developers, though these threats are currently less likely in the depressed economic climate. The Society is often asked to lend its voice to protests against such developments. Council's view is that an appropriate campaigning body in such cases is the London Wildlife Trust, the LNHS being better placed to provide evidence-based advice if required. Our partnership with GiGL helps ensure that our high-quality validated records are available for such purposes.

This report has been prepared with due regard to the Charity Commission's guidance on public benefit.

Treasurer's report for 2010/2011

As last year, the Society's accounts are presented on a receipts and payments basis, as permitted by the Charity Commission, which will be simpler and cheaper to produce in future years.

At the end of the financial year on 30 June 2011, the total net assets of the Society as detailed in the Statement of Assets and Liabilities were £315,711 compared with £322,829 the previous year.

The Receipts and Payments Accounts for the year show that receipts exceeded payments by £4,160 (2010: Payments exceeded receipts by £9,326).

Receipts from members and supporters amounted to £21,839 compared with £25,723 the previous year, which included two years' Gift Aid tax repayments. Total receipts in the year amounted to £172,310 (2010: £29,141) which included transfers from the COIF Deposit Fund in the year amounting to £139,500. This was part of the reordering of the Society's investments, which are now largely in the COIF Charities Fixed Interest Fund and M&G Charibond, resulting in a significant increase in investment income and interest, to £10,217 compared with £2,587 in the previous year.

Total expenditure was £168,150, compared with £38,467 in the previous year and this is largely due to the purchase of the M&G Charibond investment amounting to £135,000 in the year. Otherwise the most significant difference was a 33 per cent reduction in journals publication costs, to £7,964 (2010: £11, 902).

Reserves policy

The Society's unrestricted general funds can be regarded as expendable endowment since they are invested to provide a regular source of income as well as capital growth, over time.

Statement of trustees' responsibilities

Law applicable to charities in England and Wales requires the trustees to prepare financial statements for each financial year which give a true and fair view of the charity's financial activities during the year and of its financial position at the end of the year. In preparing those financial statements the trustees are required:

- to select suitable accounting policies and then apply them consistently
- to make judgements and estimates that are reasonable and prudent
- to state whether applicable accounting standards and statements of recommended practice have been followed subject to any departures disclosed and explained in the financial statements

- to prepare the financial statements on the going concern basis unless it is inappropriate to presume that the charity will continue to operate.

The trustees are responsible for keeping accounting records which disclose with reasonable accuracy at any time the financial position of the charity and enable them to ensure that the financial statements comply with the Charities Act 1993. They are also responsible for safeguarding the assets of the charity and hence for taking reasonable steps for the prevention and detection of fraud or other irregularities.

Independent examiner's report to the trustees of the London Natural History Society

I report on the financial statements of the charity for the year ended 30 June 2011 as set out below.

This report is made solely to the charity's trustees, as a body, in accordance with section 43 Charities Act 1993 (as amended). My work has been undertaken so that I might state to the charity's trustees those matters I am required to state to them in this report and for no other purpose. To the fullest extent permitted by law, we do not accept or assume responsibility to anyone other than the charity and the charity's members as a body, for this report, or for the opinions we have formed.

Respective responsibilities of trustees and examiner

The charity's trustees are responsible for the preparation of financial statements. The charity's trustees consider that an audit is not required for the year (under section 43(2) of the Charities Act 1993 (the Act)(as amended)) and that an independent examination is needed.

It is my responsibility:

- to examine the financial statements under section 43(3)(a) of the 1993 Act
- to follow the procedures laid down in the General Directions given by the Charity Commissioners under section 43(7)(b) of the 1993 Act
- to state where particular matters have come to my attention.

Basis of independent examiner's report

My examination was carried out in accordance with the General Directions given by the Charity Commissioners. An examination includes a review of the accounting records kept by the charity and a comparison of the financial statements presented with those records. It also includes consideration of any unusual items or disclosures in the financial statements and seeks explanations from you as trustees concerning any such matters. The procedures undertaken do not provide all the evidence that would be required in an audit, and consequently no opinion is given as to whether the financial statements present a 'true and fair view' and the report is limited to those matters set out in the statement below.

Independent examiner's statement

In connection with my examination, no matter has come to my attention:

(a) which gives me reasonable cause to believe that in any material respect the requirements:

- to keep accounting records in accordance with Section 41 of the 1993 Act
- to prepare financial statements which accord with the accounting records and to comply with the accounting requirements of the 1993 Act have not been met; or

(b) to which, in my opinion, attention should be drawn in order to enable proper understanding of the financial statements to be reached.

J. L. Meyer, FCA

Meyer Williams (Chartered Accountants)
Queen Alexandra House,
2 Bluecoats Avenue,
Hertford, Herts SG14 1PB

4 November 2011

Statement of assets and liabilities as at 30 June 2011

	2011		2010	
	£	£	£	£
Monetary assets				
Bank balances:				
National Westminster current account		4,850		—
National Westminster reserve account		4,139		5,076
Cash in hand		716		469
		9,705		5,545
Investment assets				
M&G Charibond		131,253		—
COIF Fixed Interest Fund		128,848		—
COIF Charities Deposit Fund		47,465		320,000
		307,566		320,000
Non-monetary assets				
Sundry debtors		—		399
Current liabilities				
Sundry creditors and accruals		(1,560)		(3,115)
Net assets		£315,711		£322,829

Approved on behalf of the trustees on 3 November 2011

J. Edgington – President

M. J. West – Treasurer

Receipts and payments account for the year ended 30 June 2011

Receipts		2011		2010
	£	£	£	£
Receipts from members and supporters:				
Subscriptions		16,370		16,745
Donations and other income		567		1,224
Legacies		1,000		—
Tax recovered on subscriptions and donations under Gift Aid		3,902		7,754
		21,839		25,723
Sales:				
Journals		618		657
The Breeding Birds of the London Area		66		40
London's Changing Natural History		—		92
Other publications		44		35
Calendars		—		7
Merchandise		26		—
		754		831
COIF Charities Fixed Interest Fund	3,685		—	
COIF Charities Deposit Fund interest	1,006		2,541	
Income from M&G Charibond	5,503		—	
Bank Deposit Account interest	6		5	
Interest on Gift Aid tax recovered	17		41	
		10,217		2,587
Asset and investment sales:				
Receipts from COIF Charities Deposit Fund		139,500		—
Total receipts		172,310		29,141
Less: total payments (below)		(168,150)		(38,467)
Net receipts / (payments) for the year		4,160		(9,326)
Cash at bank and in hand as at 1 July 2010		5,545		14,871
Cash at bank and in hand as at 30 June 2011		9,705		5,545

Payments

	2011		2010	
	£	£	£	£
Meetings costs, sectional and general expenditure:				
Hire of halls and rooms	**1,031**		1,130	
Lecturers' fees and expenses, sectional expenses etc.	**799**		1,207	
Postage and telephone	**193**		196	
Stationery	**108**		93	
Services	**591**		173	
Independent examiner's fees	**2,115**		2,616	
Insurance	**1,853**		1,906	
Honorarium and expense allowances	**626**		124	
Bank charges (net of refunds)	—		20	
		7,316		7,465
Grants payable:				
Grant to Hertfordshire Natural History Society for *The flora of Hertfordshire*	—		1,000	
Grant to RSPB for Sparrow project	**200**		—	
		200		1,000
Publications:				
Printing and expenses:				
The London Naturalist No. 88	—		6.596	
The London Naturalist No. 89	**4,497**		—	
London Bird Report 2006	—		5,306	
London Bird Report 2007	**3,467**		—	
		7,964		11,902
Programme	**594**		588	
Bulletin and *Newsletters*	**4,689**		5,181	
Mailing	**6,759**		7,757	
		12,042		13,526
Publications / journal sales expenditure		**276**		221
Library		**5,179**		3,469
Publicity		—		884
Merchandise		**173**		—
Asset and investment purchases:				
Purchase of M&G Charibond investment		**135,000**		—
Total payments for the year		**£168,150**		£38,467

Official and sectional reports for 2011

CONSERVATION

The London Biodiversity Partnership (LBP) had a challenging year. In August we had to say farewell to Amanda MacLean, our hard-working Coordinator. Previously employed by LBP as the London Boroughs Biodiversity Action Plan (BAP) Coordinator, Amanda brought a wealth of knowledge about conservation issues in London and how individual boroughs were responding to them. Many of these issues have been outlined in previous conservation reports. She was the obvious choice to take over the wider role of Coordinator for the Partnership as a whole when Nic White stood down in 2010. It was a shame that funding for the post ran out so soon, and unfortunately, we were unable to secure replacement funding. Meanwhile, Dave Webb from the Environment Agency remained as Partnership chairman and many of the habitat and species-specific working groups continued to meet and carry out conservation work throughout London. The Data and Action Working Group, which oversees this work, will be reconvened in 2012 to take stock of current actions and to assist with the creation of additional working groups if required. The Hackney BAP took a step nearer completion and can now be found on Hackney Council's website.

In June, the government published its Natural Environment White Paper: 'The Natural Choice: securing the value of nature'. Contained within its many provisions was a policy shift towards landscape-scale conservation. With this in mind, local communities were encouraged to set up Local Nature Partnerships (LNPs), enabling conservation organizations to work with a range of partners including land managers, businesses and local authorities to identify opportunities to protect and improve nature at the local level. To this end, Defra made available some 'seed-corn' funding for groups to explore what these LNPs might encompass. LBP has been investigating the feasibility of setting up such an LNP, together with GiGL, the London Climate Change Partnership, the London Geodiversity Partnership, the London Boroughs Biodiversity Forum and the London Parks and Greenspace Forum. Further work on this will continue in 2012 and possible synergies with the existing All London Green Grid will be explored.

The London Invasive Species Initiative (LISI) had a very active year finalizing an outline plan and working on a list of priority plant and animal species of concern for London. Being an international city, London has a higher risk of non-native species appearing and becoming invasive here than anywhere else in the UK. The latest list of sixty-four such species can be found on the LBP website. In addition to the 'usual suspect' plants (tree-of-heaven *Ailanthus altissima*, floating pennywort *Hydrocotyle ranunculoides*, etc.), the list includes others that may be more of a surprise (pale galingale *Cyperus eragrostis* and holm oak *Quercus ilex,* for example). The hard work of Joanna Heisse from the Environment Agency was recognized with a successful bid to Defra, who will be funding a project manager post for four years. This will allow LISI to develop the action plan and to co-ordinate work across London. The post will be hosted by GiGL and we hope that someone will be appointed early in 2012. Dr Mark Spencer represents the LNHS on the LISI steering group.

During the course of the year, LBP and a range of concerned London boroughs held regular meetings with Thames Water to discuss issues arising from the proposed Thames Tideway Tunnel. This ambitious and long-overdue undertaking is designed to address the long-standing problem of the discharge of untreated sewage into the River Thames. It will involve the construction of a 15-mile, 7.2 metre diameter, tunnel (the deepest and longest ever built in the capital), which will intercept the overflows from fifty-seven existing Victorian sewers and convey this to an expanded Sewage Treatment Works at Beckton. Construction is due to begin in 2015/16 and when completed will effectively divert an average of thirty-nine million tons of untreated sewage from entering the Thames every year. This work will bring enormous ecological benefits to the river and particularly to its fish populations. Much monitoring work is currently under way so that future changes can be assessed.

I am most grateful to Valerie Selby for much of the information contained in this report.

DAVID BEVAN, *Conservation Officer*

BOTANY

At our AGM on 10 November 2011, Fred Rumsey of the Natural History Museum gave us a comprehensive survey of 'The Alien Ferns of London', noting that they are under-recorded, partly because they are not included in general *Floras* such as Stace, or appear only selectively. There are ten to twelve thousand species of ferns worldwide, mainly in the tropics, but only about 120 in Europe. The UK has a large percentage of those in Europe. London is a heat island where marginal plants can overwinter, including some tropical species and garden escapes. As long as the climate is suitable, ferns have very dispersible propagules in the form of spores. Garden centres are currently selling a wide range of hardy ferns, including both native cultivars and introduced species. Those that are found in garden centres today may well be found in the wild ten to fifteen years later, particularly on walls. A particular fern to look out for as a garden escape is *Dryopteris wallichiana* (from India) now being sold in garden centres. This is difficult to distinguish from the native woodland ferns *D. dilatata* and *D. felix-mas.*

Fred gave examples of a number of native species that have managed to establish themselves despite being outside their normal range and habitat. Among the examples were *Gymnocarpium robertianum*, which used to be found at Kew Station fifty years ago although it is a species of upland areas on limestone. Nonetheless, it can cope in lime mortar in walls. *Asplenium viride* is found at Ravenscourt Park Station, doing well on walls, though this is not at all its natural habitat, which is in wetter, calcareous uplands. *Selaginella kraussiana* (a clubmoss) has a mainly Atlantic distribution. It can be spread through grass clippings and grows in damp lawns. It is not seen much in London, but may spread.

Fred noted that there were considerable difficulties with identification of many alien ferns, even in distinguishing between native and alien species. There are doubts, for example, about the native status of *Equisetum ramosissimum* — branched or Boston horsetail, the main horsetail found in the Mediterranean area. The problem with many alien ferns is that they often do not live long enough to develop characteristics that would allow a positive identification. The majority are apogamous and are found growing on walls. They seldom reproduce sexually.

Cyrtomium is an example of a particularly difficult genus to identify because only juvenile fronds are produced, which are indeterminable. Where they are found in inner city areas, they are also difficult to identify because they often grow in inaccessible basements. *Cyrtomium falcatum* could be a major invasive weed if the climate heats up — though it is not the commonest *Cyrtomium.*

The only currently known example of hybridization between a native fern and an alien one is the cross between *Polystichum setiferum* and *P. munitum.* It occurs in Surrey and is named *P.* × *lesliei* after its finder, Dr Alan Leslie.

Indoor meetings

The year began with two of our favourite meetings — Best Botanical Photographs and the highly entertaining Botany Quiz, organized by George Hounsome and John Swindells. In February and March we explored groups which we do not often focus on: Fred Rumsey ran a fascinating workshop on non-native ferns in London; and Jeffrey Duckett gave a London perspective on mosses and liverworts.

For the rest of the year, meetings concentrated on improving ID skills to support recording for the new *Flora of London* project. John Swindells ran a workshop on using a flora — an important skill for recording; and Mark Spencer ran a series of workshops on difficult-to-identify groups including *Carex, Conyza, Aster* and *Solidago,* aquatic plants, *Cotoneaster,* and finally, *Crataegus* and *Sorbus.*

Field meetings

A very busy programme of field meetings was organized by George Hounsome, our esteemed field meetings secretary. This year they focused primarily on recording for the new *Flora of London,* with surveys in areas as varied as Acton and Acton Park, Wimbledon Village and Common, Shepherd's Bush, Whitewebbs Wood and Park, Notting Hill, Ruislip Woods, two areas of south Essex, Bentley Priory, Hampton, Kensington Gardens and Mayfair in central London, Downham Fields and Snaresbrook. In addition, there was a winter visit to the Isle of Dogs in February led by John Swindells, two further visits to London Zoo led as usual by Sven Seiffert, and trips during the summer to Horsell Common, Nonsuch Park, and Shoebury Ranges and Gunners Park, S. Essex. In September, Paul Bartlett led us along the Thames Path from Teddington to Richmond. Old favourites included John Swindells' Pot Luck in the East End in June and Nick Bertrand's exploration of urban Lewisham on 1 October.

Flora of London

Higher plant recorder Mark Spencer reports good progress on the new *Flora.* A system for reporting data for the *Flora* has now been worked out and appears to be functioning well, although some contributors continue to need support in understanding the process. This has been a complex exercise because of the overlaps between the area covered by the *Flora* (the London polygon) and the various surrounding vice-counties. GiGL has been involved in coordination. Mark has also set up a Yahoo group to improve communications on the *Flora.*

Another massive job is to collate and consolidate all the historical data on the London flora, including, for example, Rodney Burton's original *Flora of London* and Douglas Kent's *Flora of Middlesex* and other publications. Herbarium material is also being examined, and Mark welcomes herbarium specimens though at present, resource issues limit how much can be accepted.

Ten-kilometre-square coordinators have been recruited and report to Mark or vice-county recorders on the data they receive. Recording meetings have continued throughout the year and data have been flowing in, though it is inevitably uneven at this stage, with some areas receiving more attention than others. Mark is particularly requesting information on a selection of threatened plants (widespread but rapidly declining). To encourage more people to get involved in recording and to raise the skills of those who are already involved, a number of ID training sessions have been held.

If you would like to participate in work on the new *Flora*, please contact Mark (72 Michael Cliffe House, Skinner Street, London, EC1R 0WX; Tel.: [+44] 020 7837 1471; E-mail: Lnhs_plant_recorder@hotmail.co.uk).

Recorders' reports

Bryophytes

Recording has been slow in 2011, partly due to the personal circumstances of the recorder and to the lack of records submitted. Hopefully the lack of records received will be rectified in part by the publication of the first field guide to the bryophytes of the British Isles. This will hopefully encourage botanists to widen their interests to mosses and liverworts. In addition to the increased accessibility, further encouragement to record bryophytes should come from two current projects. One important project is the development of a bryophyte checklist for London, as part of the LNHS new vascular plant *Flora*.

This is an interesting project as, although mosses and liverworts have been studied in London for many years (there are records from 1721), a flora or checklist has never been produced. This project will mainly look at collating and checking the current records of bryophytes in London. However, during the next few years, as the project develops, new records will need to be collected and added to the final publication, so this is an opportunity to send in your records so they can be included in the final draft.

The other project is the British Bryological Society's collection of records for the production of a new atlas of mosses and liverworts of the British Isles. As a result, hopefully 2012 will be a productive and interesting year for the recording of bryophytes in London.

Fungi

Fungal seasons are heavily influenced by the pattern of rainfall and temperature, which have recently shown wider fluctuation than has been noted since meteorological records began. The most striking variation in 2011 was the period of heavy rainfall in late summer which produced an exceptional fruiting of summer species, especially boletes, tricholomas and lactarii. In Alexandra Park alone two Red Data list rarities appeared for the first time: poplar knight *Tricholoma populinum* was found in abundance by Keir Mottram and Ed Taylor under the white poplars that form a large plantation on the south slope; *Boletus legaliae* put in a rare appearance under one of the old field boundary oaks near the eastern exit from the park. Good quantities of the huge milkcap *Lactarius controversus* also appeared under the poplars.

The autumn foray was as usual very well attended and produced a fine crop of common and less-common species. These included a reappearance of the coral tooth *Hericium coralloides* in its usual tree in Tottenham Cemetery. Also in the cemetery forayers found a handgun which was of great interest to the Special Branch! Urban foraying has its surprises, not all fungal. The autumn/winter species then continued fruiting without any pause through to February, even after the snowfall. Milder winter temperatures are becoming the rule and fungi respond accordingly. All in all, it was an excellent year for mycologists.

DAVID BEVAN, *Chairman,* SARAH GRAHAM-BROWN, *Secretary*

ECOLOGY AND ENTOMOLOGY

In February our indoor meetings secretary, Claudia Watts, arranged a workshop in the Angela Marmont Centre at the Natural History Museum on 'Mounting, pinning and storing insects for purposes of identification, reference collections and voucher specimens'. This was led by professional entomologists John and Barbara Ismay.

Our summer activities are focused on looking for invertebrates in the varied habitats of the London Area. Field meetings secretary Tristan Bantock organized twenty-one field trips during the year including one held jointly with Butterfly Conservation. In addition, the monthly Bookham Common meetings continue to be attended by a regular group with entomological interests. In October we began a new venture with a field trip not published in the printed *Programme* but by notification on the members' message board. Four members joined Tommy Root to visit two small local nature reserves in the Borough of Camden to look for plant galls. Although most field meetings will continue to be published in the *Programme*, using the message board will give us flexibility to arrange meetings at short notice when weather conditions are favourable. Looking for insects in the winter months is a particular problem in this regard.

September was the occasion of our annual joint meeting with the British Entomological and Natural History Society attended by members of the two societies and many guests, over fifty people in all. At this year's event Stuart Roberts, chair of BWARS, gave the eighteenth Brad Ashby Memorial Lecture with the title 'Bee decline: countdown to catastrophe?'. After a general introduction on species and the numbers of bees in the UK and worldwide, he tried to answer the question in the title of his talk. Some problems in assessing the rate of decline include inconsistent data and poor records. Excellent honeybee records are kept in Sweden showing that numbers today are the same as in the 1920s with peaks in population in the 1940s and 1980s. Other studies have shown a decline in diversity, with common species becoming more common and rare species becoming rarer. No one factor has been identified but decline is due to a variety of stresses identified in honeybees as colony collapse disorder (CCD). Honeybees are subject to several viruses and insect pests but habitat loss contributes to half the decline in other species of bee. The decline in numbers of bees of all species has a significant impact on pollination of food crops throughout the world and is of major concern.

At the AGM in November Catherine Schmitt stood down as sectional secretary and Keir Mottram was elected to the post. Long-serving committee member and former recorder of plant galls, Isopoda and Myriapoda, Ken Hill stood down and was warmly thanked for many years of service to the Society. All other members of the committee were re-elected and Catherine was elected as sectional representative on Council. Tommy Root was elected as recorder of plant galls; all other sectional recorders were re-elected.

The AGM was followed by a sectional meeting with a 'Photographic Review of the Year' which included contributions from recorders, covering invertebrates found during the many field trips, with highlights being images of some of the species new to the London Area. These included the continued presence of a native of Ethiopia, the southern green shieldbug *Nezara viridula,* the violet carpenter bee *Xylocopa violacea,* an orange ant, *Temnothorax unifasciatus* and Turkish snail *Helix lucorum*. Neil Anderson reported two Odonata just outside our area which are anticipated to arrive soon in the London Area — southern migrant hawker and scarce emerald damselfly. Edward Milner continues to monitor, among other sites, Mile End Park, where a spider new to Britain, *Anyphaena sabina,* was found in July this year. He has also taken the opportunity to engage in some small-scale habitat creation and re-creation at this site. Tom Langton, our recorder of reptiles and amphibians has been studying the arrival and spread in the wild of non-native species which were outlined to the members present. With colleagues he has written two papers, one on distribution and predator/prey impacts of these 'invaders' and one on disease impacts and finding of solutions. These papers both appeared in *The London Naturalist* **90**, 2011.

Later in November, David Wembridge gave a talk on hedgehogs. A number of surveys have indicated a significant decline in hedgehog numbers although reasons for the decline are not clear. These may include loss of habitat from more intensive agriculture, smaller tidier fenced gardens and competition with badgers who are natural predators of hedgehogs in reduced habitat area. The People's Trust for Endangered Species and the British Hedgehog Preservation Trust have embarked on a number of research projects so they can advise on how to manage rural habitats and raise awareness in urban areas of ways of helping hedgehogs.

The chairman continues to explore initiatives that can be implemented over time to raise member interest and assist recorders to fulfil their responsibilities. Once again the Section represented the Society at the Amateur Entomologists' Society Exhibition, signing up a new member and selling books and journals as well as making the work of the LNHS known to a wider public.

We would welcome members willing to join the committee to carry on the work of the Section and the Society.

MICK MASSIE, *Chairman,* CATHERINE SCHMITT, *Secretary*

LONDON BIRD CLUB

The London Bird Club, under its new name, has maintained steady growth. Trips to identify birds at hotspots around London were arranged nearly every weekend and new venues were tried for the coach outings. Everyone involved in the *London Bird Report* made a magnificent effort and two editions were published during the year, the 2007 and the 2008 reports. Work on the 2009 and 2010 reports is under way. The survey work for the London Bird Atlas, which is being undertaken in conjunction with the BTO, will continue for another year after four years' field work. Again a great effort from all participants.

Pete Lambert reports on the field meetings. 'During the year above we had thirty-nine walks. In addition to the regular walks, trips were arranged to Cassiobury Park/Whippendell Woods, Staines Reservoir and Moor, Ruislip

Woods and Princes Coverts, all of which were sites we have not visited recently. We also had two introductory walks. The first was at Regent's Park to help people identify which family a bird belonged to. The second was at Hyde Park and Kensington Gardens, which was an introduction to identifying gulls.

'Although our walks are not just about seeing something special, notable highlights included water pipit at Beddington, bittern and smew at Cheshunt, forty-five waxwings at Tooting and ring-billed gull at Southend. Waders are not seen very often in London, so our regular walk outside the London Area at Two Tree Island is recommended for anyone wanting to see a lot of waders. The number of cuckoos seen in London continues to decline and only one of this year's walks reported a cuckoo.

'In addition to all those mentioned above, our leaders introduced people to the changing bird life of London throughout the year, and I would like to thank them all for giving up their time to do this. New leaders are always welcome.'

Neil Anderson reports on the coach trips. 'In January we had a full coach for Lakenheath and Welney. There were plenty of winter thrushes, marsh tit and a merlin at the former, and plenty of wildfowl, peregrines and tree sparrows at the latter. We went to Grafham Water in February on a dry but windy day. It is a great place for wildfowl with good numbers of goldeneye and goosander as well as red-necked grebe and we had excellent views of bullfinches from the hides. Our first spring trip was to a new venue for us — we went to Paxton Pits. Frequently I am asked to try new sites to encourage more people. Not for the first time this did not happen. A paltry twenty people booked, which meant we made quite a loss on it. I decided to let the trip run and those present had a superb day with excellent views of nightingales and cuckoos as well as many other species. It was also excellent for dragonflies, with scarce chaser seen well. The final trip of the season to Strumpshaw Fen was led by Pete Lambert, to whom I am indebted, as I was overseas. It was a successful day with marsh harriers, hobby and Cetti's warbler amongst the birds seen and swallowtail and Norfolk hawker amongst the insects. Thanks to all, especially Mike Trier for the administration work, and to Pete and all who have supported the coach meetings.'

In 2011, there were no indoor meetings in January or February, as we had no indoor meetings secretary. In March, there was a well-attended talk on the hummingbirds of Ecuador and in April there was again a well-attended talk by David Lingard on protecting birds in Italy. At that meeting, we were very fortunate when Kat Duke stepped forward to volunteer as indoor meetings secretary. She has brought an enthusiasm and a drive to improve attendance by endeavouring to find out what sort of talks members would like, by means of a questionnaire. She is experimenting with venue options and has arranged two meetings at Imperial College and two at Camley Street Natural Park. The September talk at Imperial College on the Russian Far East attracted about sixteen people and the October talk on Fen Drayton Lakes at Camley Street attracted ten people. We are always interested to hear just what talks would interest you, whether you are a beginner or an expert. For example, would you like more scientific talks or more talks on birdwatching areas around London? Please let the Committee know.

Andrew Self, the chairman of the Recorders Committee, reports that this year there has been one change of recorder, with Sean Huggins replacing Mark

Pearson as Middlesex recorder. Sean will start on the 2010 records. All of the 2009 records were completed so that work on the 2009 *LBR* commenced in late 2011. The recorders put in a lot of hard work to help the *LBR* editorial board meet their production schedule; two *LBR*s were published in 2011 and it is hoped two more will be published in 2012. Data for 2010 were also sent to the Rare Breeding Birds Panel.

Bob Watts, the chairman of the Rarities Committee, reports: 'The past year has continued with the increasingly efficient processing of recent records. The committee has now expanded to five members, with the addition of Nick Tanner, the Surrey recorder. Several species were either wholly or partially removed as notes species. Recorders still have the discretion to request further details where they receive unseasonal or brief records.'

Ian Woodward, the BTO contact for North London, reports that survey work on the London Atlas project continued to go well during 2010. 'We have completed around 99 per cent of the Timed Counts for winter and 95 per cent for the breeding season. Although survey work for the national project is now finished, we are continuing survey work in London for a further year and London Atlas data can still be input into the BTO Atlas website. The main focus for the additional year will be on completing the Timed Counts and obtaining additional breeding evidence next summer. Although survey work is ongoing, we are already starting to write up the results and are hoping that the Winter Atlas will be available around the end of 2013 and the breeding season Atlas around the end of 2014.'

Angela Linnell reports that the number of members of the Ornithology Reading Circle remained the same. New members are always welcome, for a small subscription, to see copies of *British Birds, Ibis, Dutch Birding, Irish Birds, Scottish Birds* and *Ardea.* She also reports that about half the London Bird Club T-shirts have been sold. Unhappily, however, when we had a stand at the Lee Valley Countryside Live in September, which featured our T-shirts and our publications and offered a reduced price for new members, we had no sales of any sort, so it has been decided not to have a stand in 2012.

The Committee look forward to hearing from members who want to make suggestions to improve the work of the London Bird Club. We hope you will take the opportunity to promote the Club, particularly to younger birdwatchers. We have a lot to offer — including the fact that the LNHS covers plants, insects and all aspects of natural history. We also hope you will suggest topics for our indoor meetings and come along on the weekly field trips, where you will find some of London's hidden gems and the chance of seeing some wonderful birds.

DAVID DARRELL-LAMBERT, *Chairman* (david@birdbrainuk.com),
ANGELA LINNELL, *Committee Secretary* (angela.linnell@phonecoop.coop)

Mushrooms, London and history

EDWARD TUDDENHAM
17 Bedford Road, London N22 7AU

Presidential Address delivered at the Annual General Meeting on 7 December 2011

Development of modern scientific knowledge concerning fungi began later than for the plant and animal kingdoms, only becoming established as a distinct field of study during the late eighteenth and early nineteenth centuries. Fungi were viewed by Linnaeus as part of the plant kingdom and he included them therein amongst the cryptogams, a scheme which persisted well into the twentieth century. The evolution of fungi and their place on the tree of life has recently been clarified by the cooperative publication in 2006 of a molecular phylogenetic classification. British students of fungi have played a seminal role in the advance of our understanding of the fifth kingdom and many of them worked in London and studied specimens collected within our area. Fungi in Britain are extremely diverse and abundant everywhere, including urban sites. Nevertheless, interest in mycology amongst British naturalists is very minor compared to botany and ornithology.

In what follows I illustrate some episodes from the history of mycology in London with examples from my own experience as the Society's first recorder for fungi, in hopes of enhancing interest in the fifth kingdom.

The title of this essay alludes to a book by Wasson and Wasson (1956) *Mushrooms, Russia and History* in which the theory was advanced that Anglo-Saxon races are mycophobic and Slavic and Latin races are mycophilic, as a consequence of our respective cultural and spiritual ancestries in the remote past of prehistory (Figure 1). The book is famous for its sensational revelation of a hallucinogenic mushroom cult in Mexico which had persisted in secret from pre-Columbian times despite suppression by Catholic friars of the sixteenth century and which was rediscovered by the Wassons. That revelation is credited with being one source of the psychedelic counter-culture of the 1960s, alongside LSD (also a fungal by-product) (Figure 2).

Close relatives of the fungi used in such rites flourish in London's parks to this day, although not with any legal ritual or other use since they are now deemed to be a Class A drug (Figure 3).

Whatever one might think of the proposal that Anglo-Saxon mycophobia is rooted in the collective subconscious, the fact remains that fungi are largely ignored, despised and feared in the United Kingdom and countries of our former empire but revered and sought after in Slavic, Scandinavian and southern European cultures. Perhaps this is why there are so few British mycologists studying the huge diversity of the British funga compared to the numerous botanists studying our depauperate flora and the even larger number of ornithologists observing the few hundred avian species that appear in these islands. As a late convert to the fungus fancy, I have tried to spread appreciation of the subject. That was also the mission of an extraordinary

Victorian naturalist and one of the fathers of British mycology — Mordecai Cubitt Cooke (1825–1914).

Cooke was, like that other unsung hero of Victorian natural history — Alfred Russel Wallace, from humble origins, largely self-taught and had to earn his living 'by the sweat of his face'; his remarkable variety of talents, his tenacity and determination, were used to great effect in pursuit of serious science and to widen popular appreciation of the natural world, especially fungi. His fame as a pioneer of taxonomic mycology continues after his death through the many taxa that bear his name and through his books *Handbook of British Fungi* (1871), *Rust, Smut, Mildew and Mould* (1865), and *Illustrations of the British Fungi* (1881) as well as *Fungi: Their Nature, Influence and Uses* (1875) which he co-authored with the Revd M. J. Berkeley, the giant of British nineteenth-century mycology and frequent collaborator of Cooke's (Figures 4 and 5).

The *Handbook* is distinguished by the fact that it covered all species reported from these islands, both macro and micro, a feat that has never been repeated in any publication. Every genus is illustrated by an exemplar and every species is described in detail and given an English name. A unique and eccentric character, Cooke's memory is well served by a fine biography written by his distant relative Mary P. English (1987) (Figure 6).

Mary, herself a distinguished medical mycologist, worked with what remained of the archives of Cooke's work to reconstruct his personal struggle in class-and-prejudice-ridden Victorian Britain. This fascinating biography shows how the son of a village grocer with no formal education, rose to be the first paid mycologist in Britain, establishing the mycology department at Kew which flourishes to this day, founded numerous societies (including in 1865 the Quekett Microscopical Club, also still flourishing), wrote and published thirty-five books, 270 articles and founded two popular and successful periodicals. He maintained a voluminous correspondence with leading mycologists around the globe, making seminal contributions to Australian and North American mycology. His interests spanned the whole fungal kingdom, being equally divided between micro and macro fungi. He was a founder member of the British Mycological Society and lived throughout his adult life in London working at the India Museum, the Natural History Museum and at Kew. His unusual domestic arrangements centred on the fact (well hidden from public view at the time) that he fathered five children with his wife's illegitimate daughter Annie from her previous relationship. He is buried in East Finchley Cemetery together with his stepdaughter/partner Annie and two of their children, although Annie's name does not appear on the stone (Figure 7).

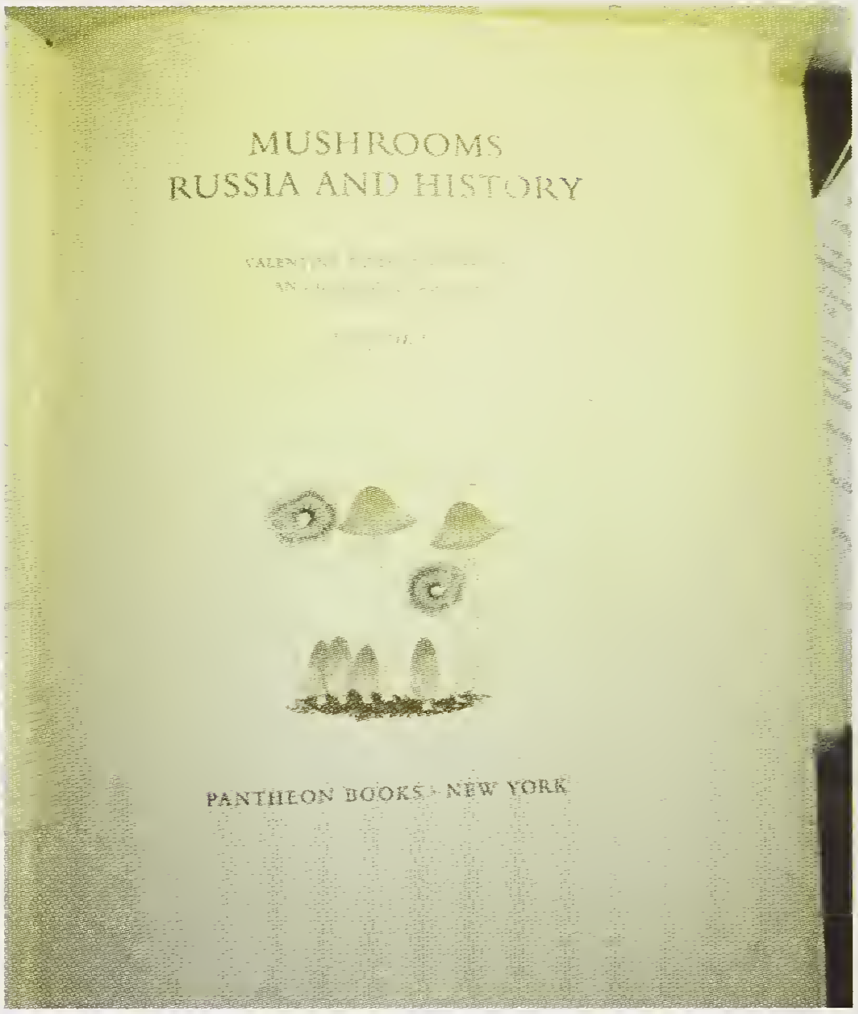
Cooke's only salaried employment from 1862 until 1880 was a part-time job as curator of the India Museum, where he was in charge of samples of all vegetable products of the subcontinent. This grew under Cooke's supervision into an enormous but highly organized and annotated archive of economic botany, which was the stepping stone to his transfer to Kew in 1880 together with most of that collection. His duties at Kew were threefold: to oversee the removal to Kew of the massive India Museum collections as an addition to the economic botany exhibition, housed in a purpose-built addition to the rear of Museum Number 1; to organize and update the fungal portion of the herbarium (what we now call a fungarium to avoid a contradiction in terms); to report on plant diseases due to fungi. Thus it was that on 21 June 1880 Cooke became the first salaried mycological taxonomist employed by Kew or indeed anywhere in Britain or her colonies, a position that continues in an unbroken line to this day. During his time at Kew he completely reorganized the fungal portion of the herbarium, incorporating Berkeley's entire fungal herbarium of over 20,000 exsiccata with a large proportion of type specimens. Also, he was able to start and complete by the end of his time at Kew a monumental series of 1,200 illustrations of British Hymenomycetes in eight volumes, the largest and most exhaustive of its kind ever published.

Following on from Cooke a series of highly distinguished mycologists were employed at Kew including R. W. G. Dennis, David Pegler, Brian Spooner and Peter Roberts. Although there has been a progressive withering of professional taxonomic mycology in Britain there are signs that the molecular approach is reviving interest in professional taxonomy and Cooke's post is now held temporarily by an expert in molecular systematics, Bryn Detinger.

While professional mycological taxonomy has dwindled towards extinction (http://news.bbc.co.uk/1/hi/uk/7752103.stm), a band of distinguished self-employed mycologists continues to put out journals (e.g. *Field Mycology* edited by Geoffrey Kibby, 2010) and books (e.g. *Collins Fungi Guide* by Stefan Buczacki (2012) — reviewed elsewhere in this issue of *LN*) and monographs (e.g. *The genus Russula in Great Britain* by Geoffrey Kibby, 2012). Even the main authors of *Checklist of the British and Irish Basidiomycota* (Nick Legon and Alec Henrici, 2005) are both self-employed. British mycologists who need broad academic coverage of our funga must turn to Continental productions for help, such as the extraordinary recent tome 'Funga Nordica' which covers some 2,675 species of agaricoid, boletoid and cyphelloid genera arranged according to the latest molecular taxonomy published in 2006 by a consortium of mycologists in *Mycologia* (Matheny et al. 2006). This landmark work consists of a multilocus phylogenetic overview of the major groups of Agaricales based on RNA sequence data from six loci. The study has resolved many long-standing problems in the systematics of this group, identified by the authors as follows: 'Overemphasis on spore deposit colour, fruit body form and some anatomical and cytological traits, in hindsight, led to the establishment of many artificial groups and unexpected phylogenetic consequences. Molecular phylogenetic analysis of ribosomal RNA sequences has transfigured the circumscription of the Agaricales in the past decade, reaffirming some ideas of earlier workers while shattering others. Some of the important revelations of these studies showed that fruit body form and hymenophore type have been phylogenetically misleading, that many families and genera of agarics were not monophyletic and that ecological traits have been underused in diagnosis of natural groups.' (Figure 8).

It is a remarkable fact that over 14,000 species of fungi occur in these islands, which is almost ten per cent of the species known world-wide, and amongst them are some of the most colourful and remarkable productions of nature. It is certainly true that the initial steps in the identification of fungi are intimidating. General advice is to go on a foray with experts to get started. There are many opportunities to do this throughout the year within the capital (Figure 9). There are also numerous popular guides to get started with, new ones appearing every year.

Fungus fruiting occurs at all seasons but there are peaks in spring and autumn. One effect of climate change has been that the autumn fungus fruiting season has been extended. It now often begins with a late summer flush which continues right through to late winter and even into the early part of the new year (Figure 10).



MUSHROOMS
RUSSIA AND HISTORY

PANTHEON BOOKS · NEW YORK

FIGURE 1. Title page of *Mushrooms, Russia and History.* Wasson and Wasson (1956). Pantheon. New York.

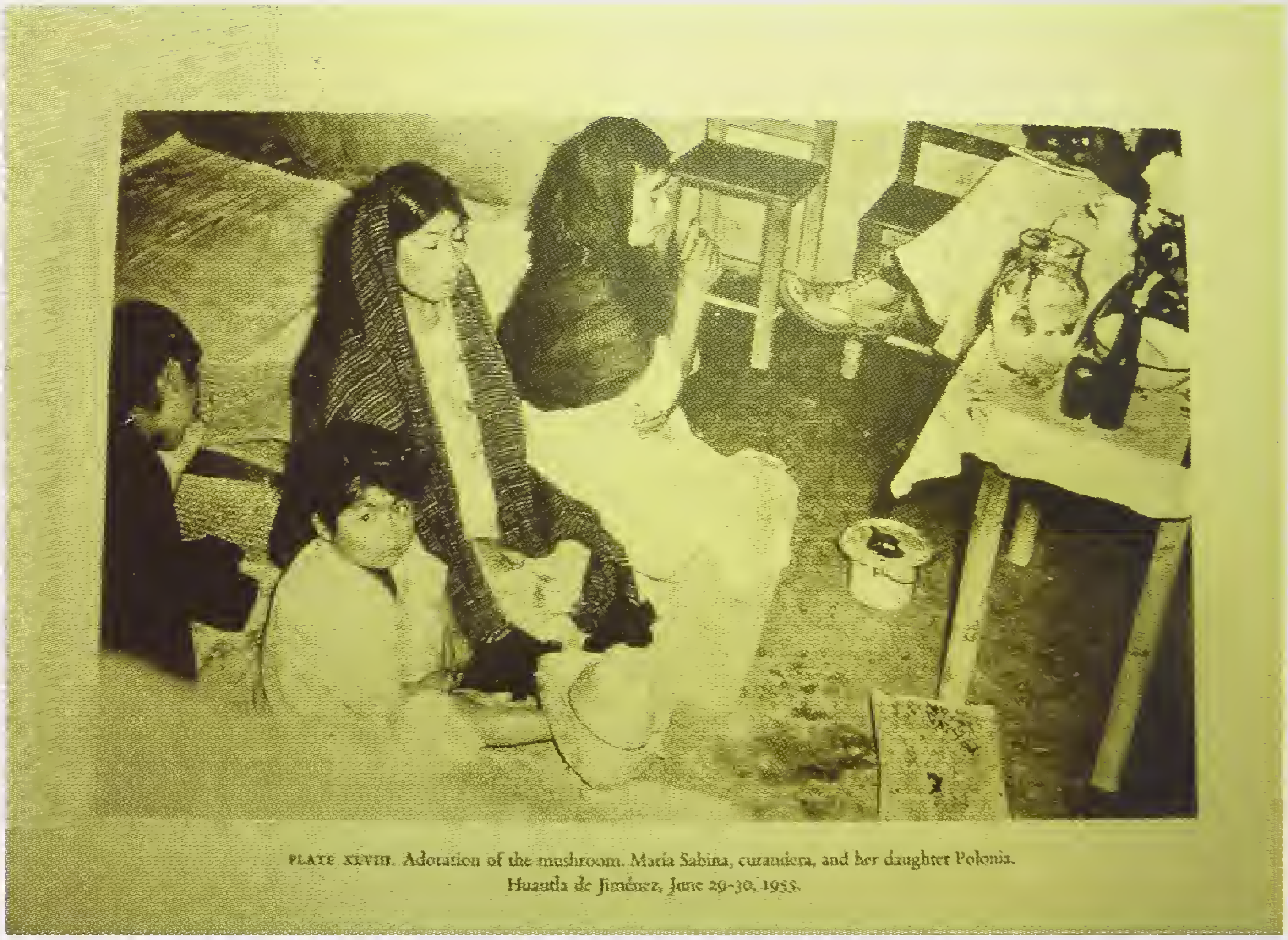


PLATE XLVIII. Adoration of the mushroom. Maria Sabina, curandera, and her daughter Polonia.
Huautla de Jiménez, June 29-30, 1955.

FIGURE 2. Photograph showing the first magic mushroom rite at which a westerner (Gordon Wasson — seated taking notes) partook of a hallucinogenic mushroom during a ceremony conducted by Maria Sabena. The species consumed was *Psilocybe caerulescens* var. *maztecorum* Heim.

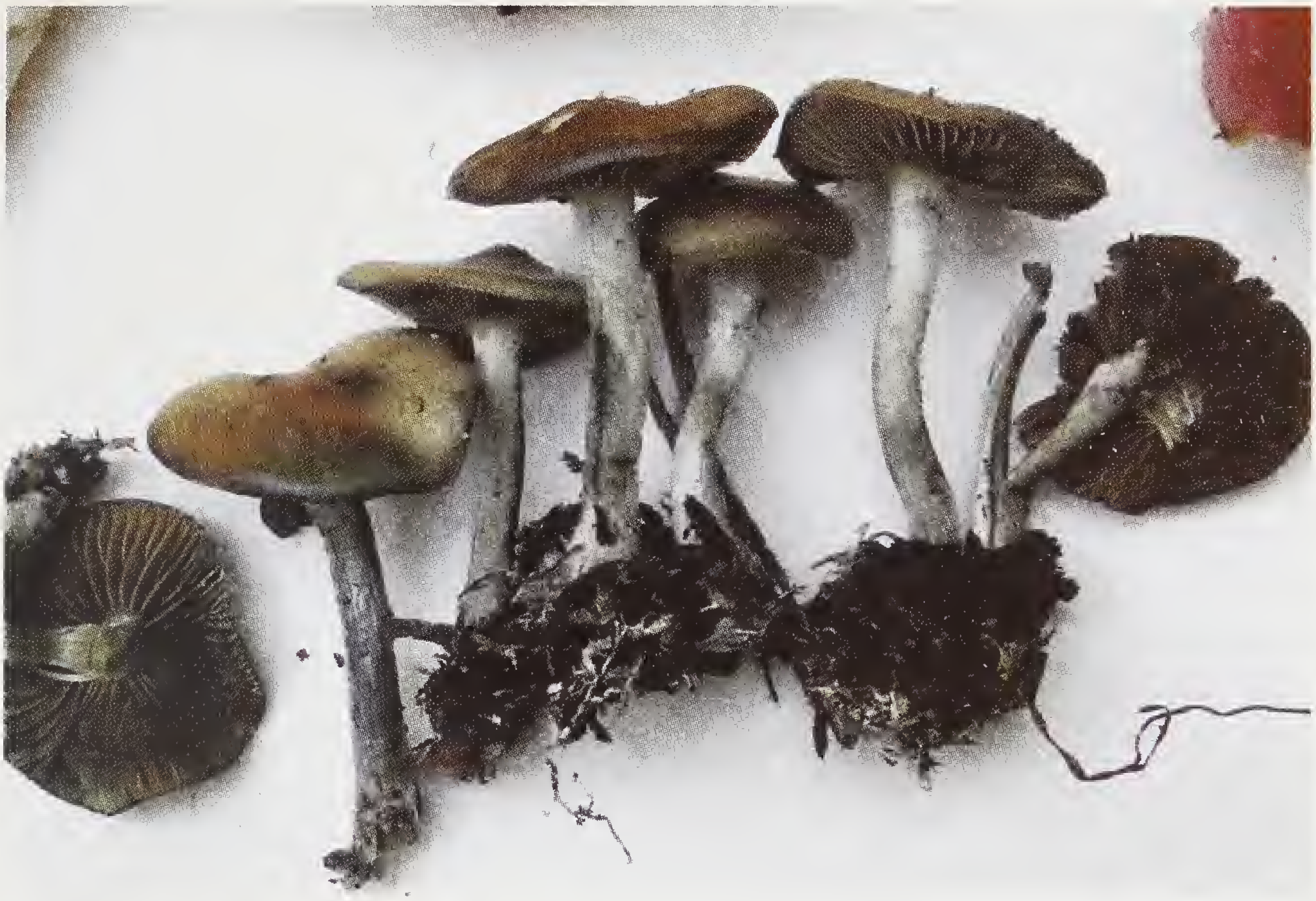


FIGURE 3. Blueleg brownie *Psilocybe cyanescens* collected from woodchip mulch in a Haringey rose garden. Note bluing of caps and stems which is characteristic of species containing the hallucinogenic Tryptamine derivative Psilocybin. Specimens may only be collected legally for submission to a fungarium, as were these.

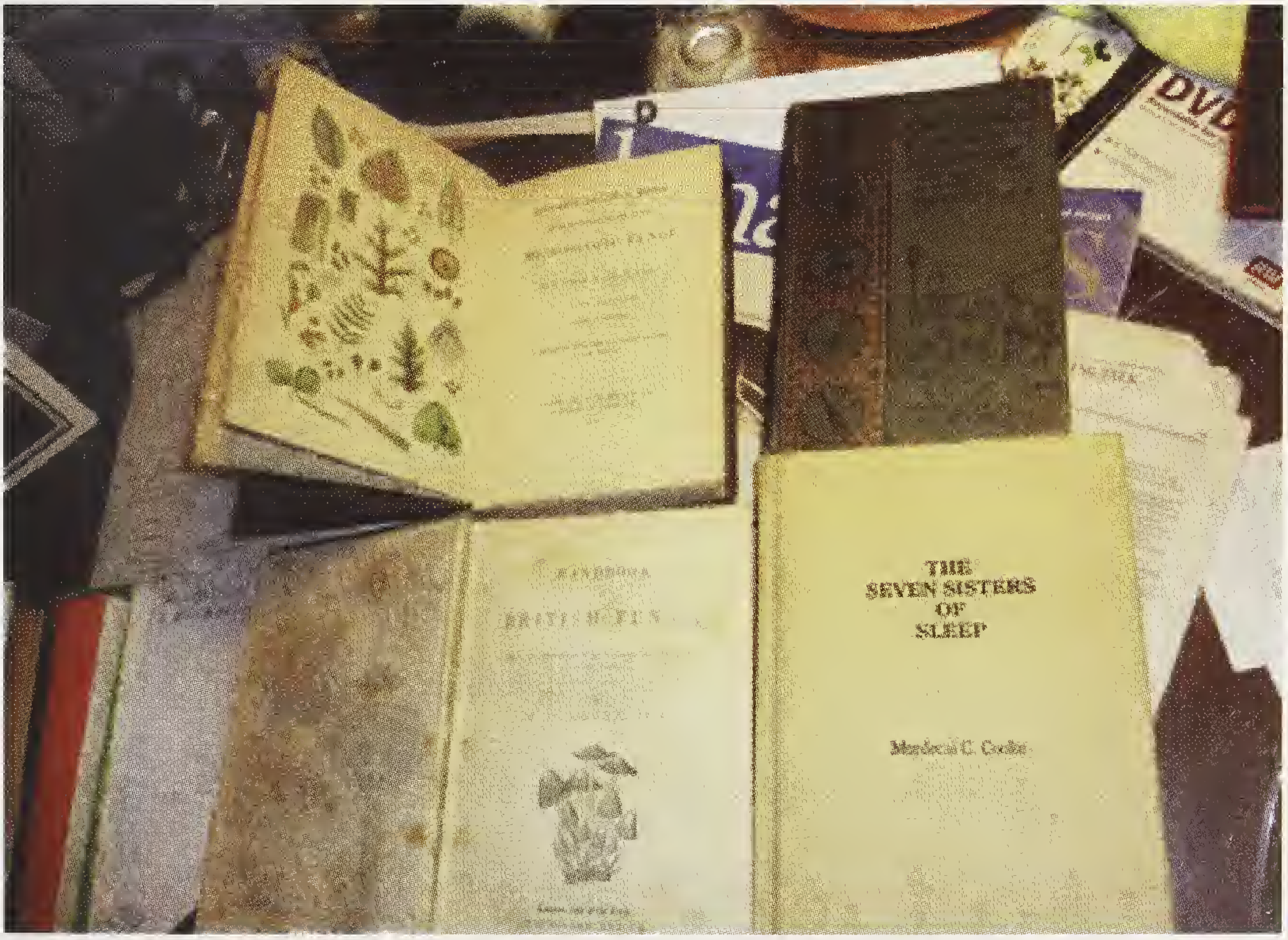
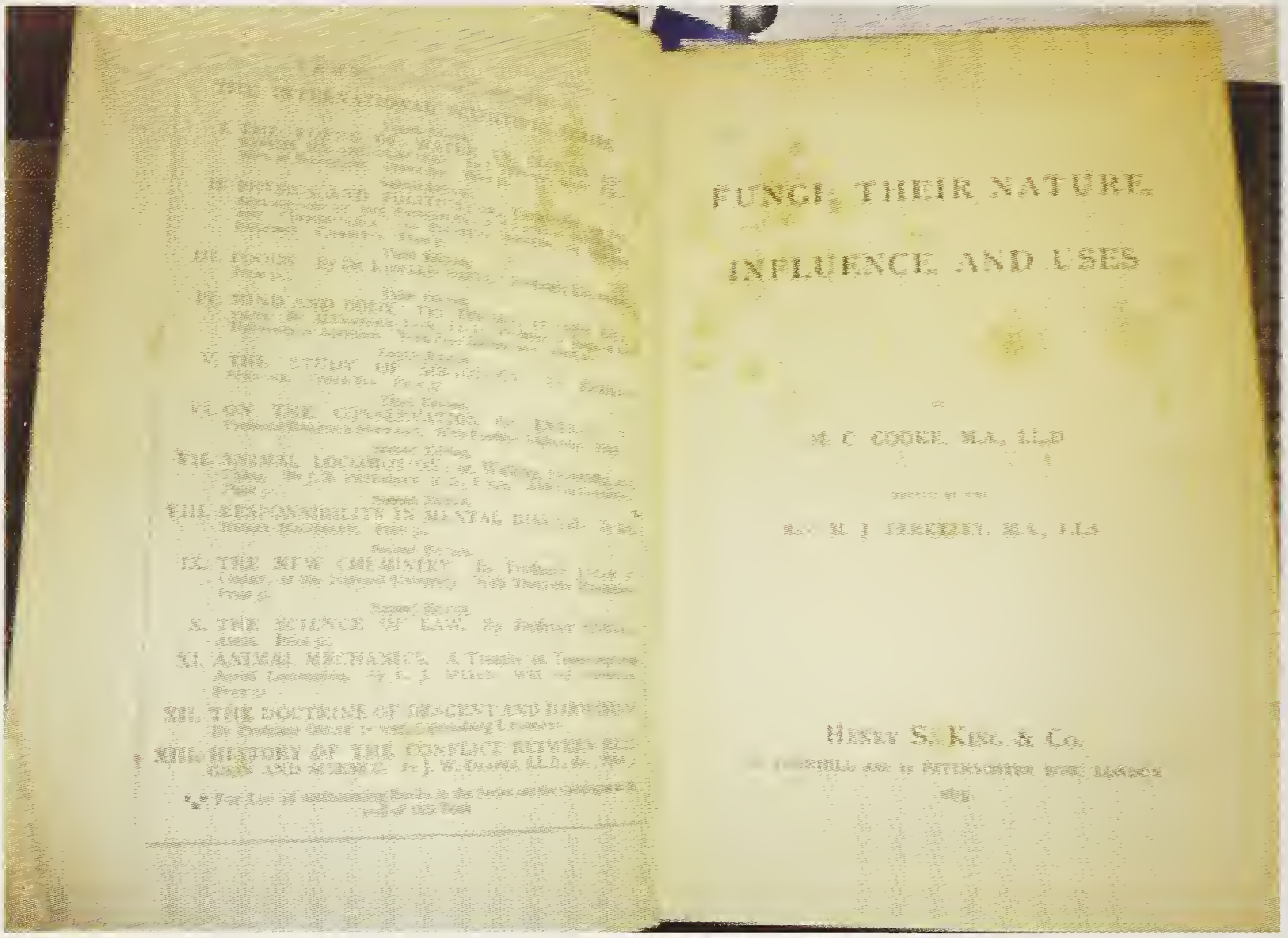


FIGURE 4. Some of Cooke's many books spread on the author's cluttered desk. Note the figure of ink caps on the frontispiece of his two-volume magnum opus *Handbook of British Fungi,* which is also carved on his tombstone (see Figure 7).

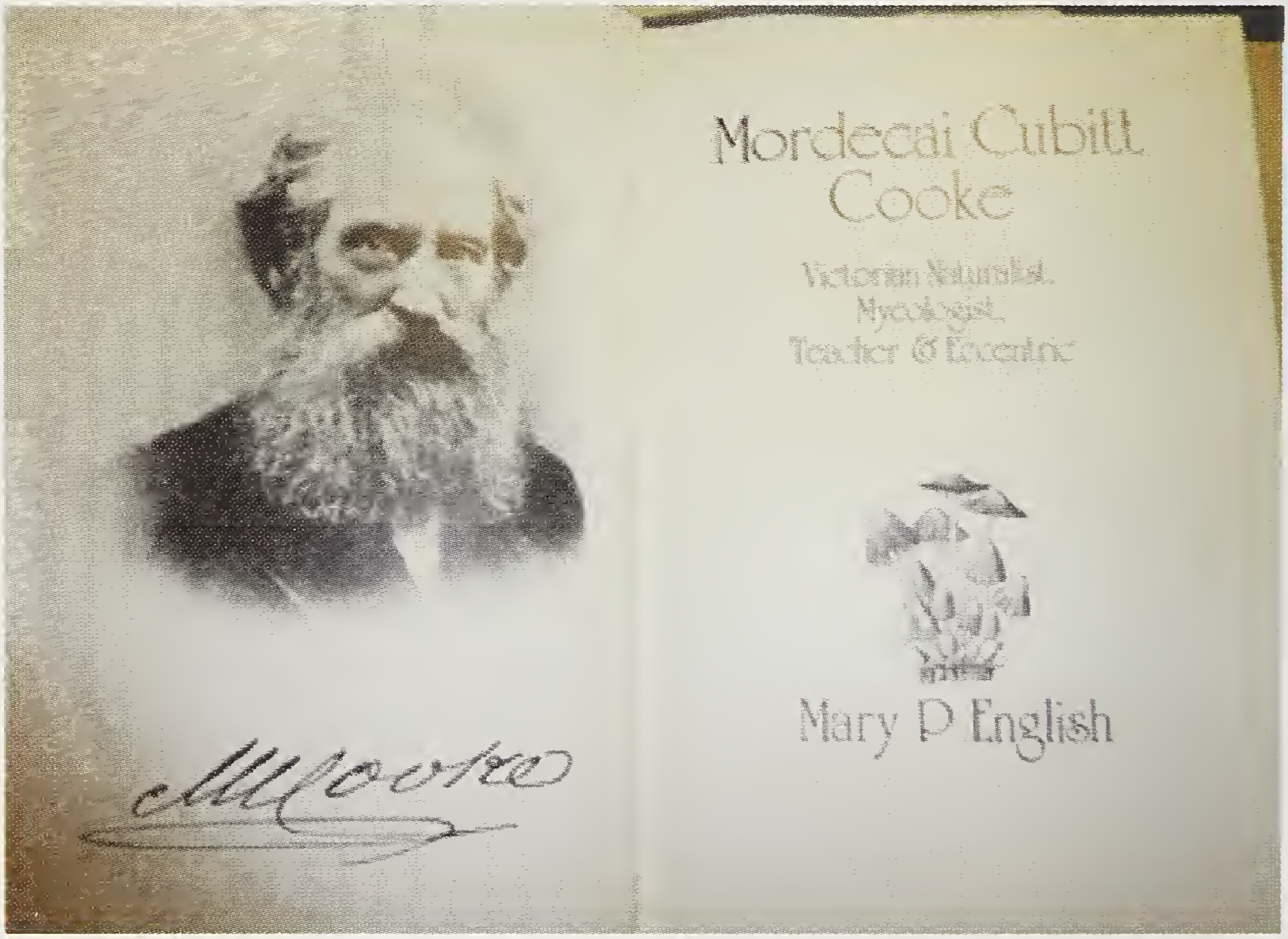


FUNGI; THEIR NATURE,
INFLUENCE AND USES

M. C. COOKE, M.A., LL.D

Henry S. King & Co.

FIGURE 5. Cooke's discursive and fascinating book on general mycology. A work which has not been equalled until Brian Spooner and Peter Roberts' recent volume in the New Naturalist series, 2005.



Mordecai Cubitt
Cooke

Victorian Naturalist,
Mycologist,
Teacher & Eccentric

Mary P English

FIGURE 6. The remarkable life of Cooke is related by Mary P. English (1987) in her scholarly and fascinating biography.

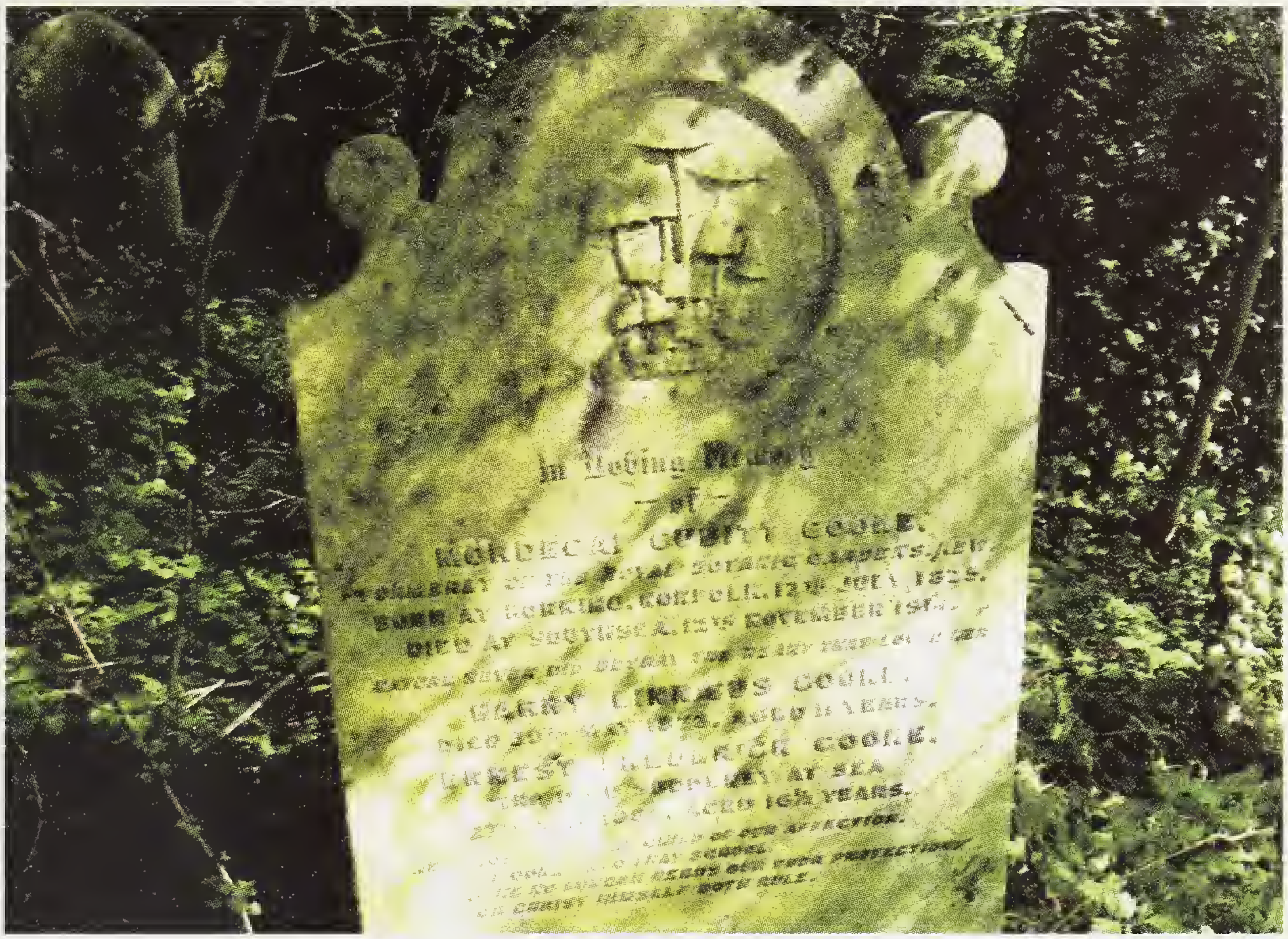


FIGURE 7. Cooke's tombstone in East Finchley Cemetery, which was visited during an LNHS foray led by the author in 2011.

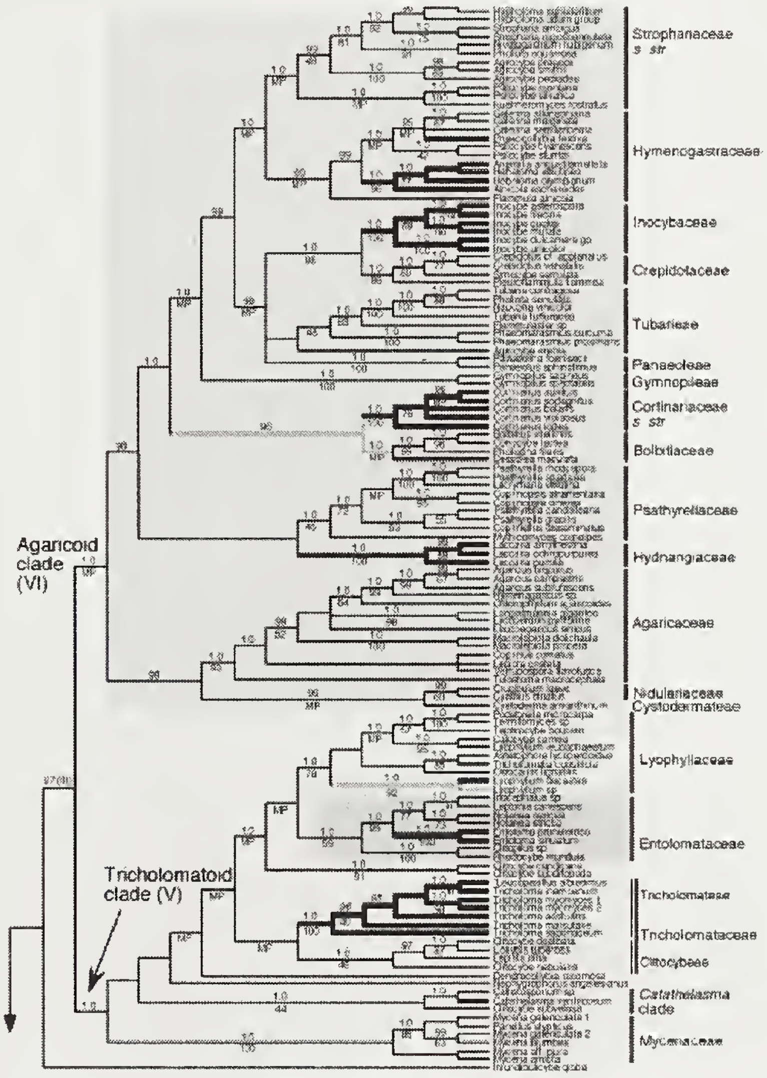


FIGURE 8. Part of the molecular cladogram relating the major groups of gilled fungi. Reproduced from *Mycologia* **98**: 982–995 (Matheny et al. 2006), with permission.

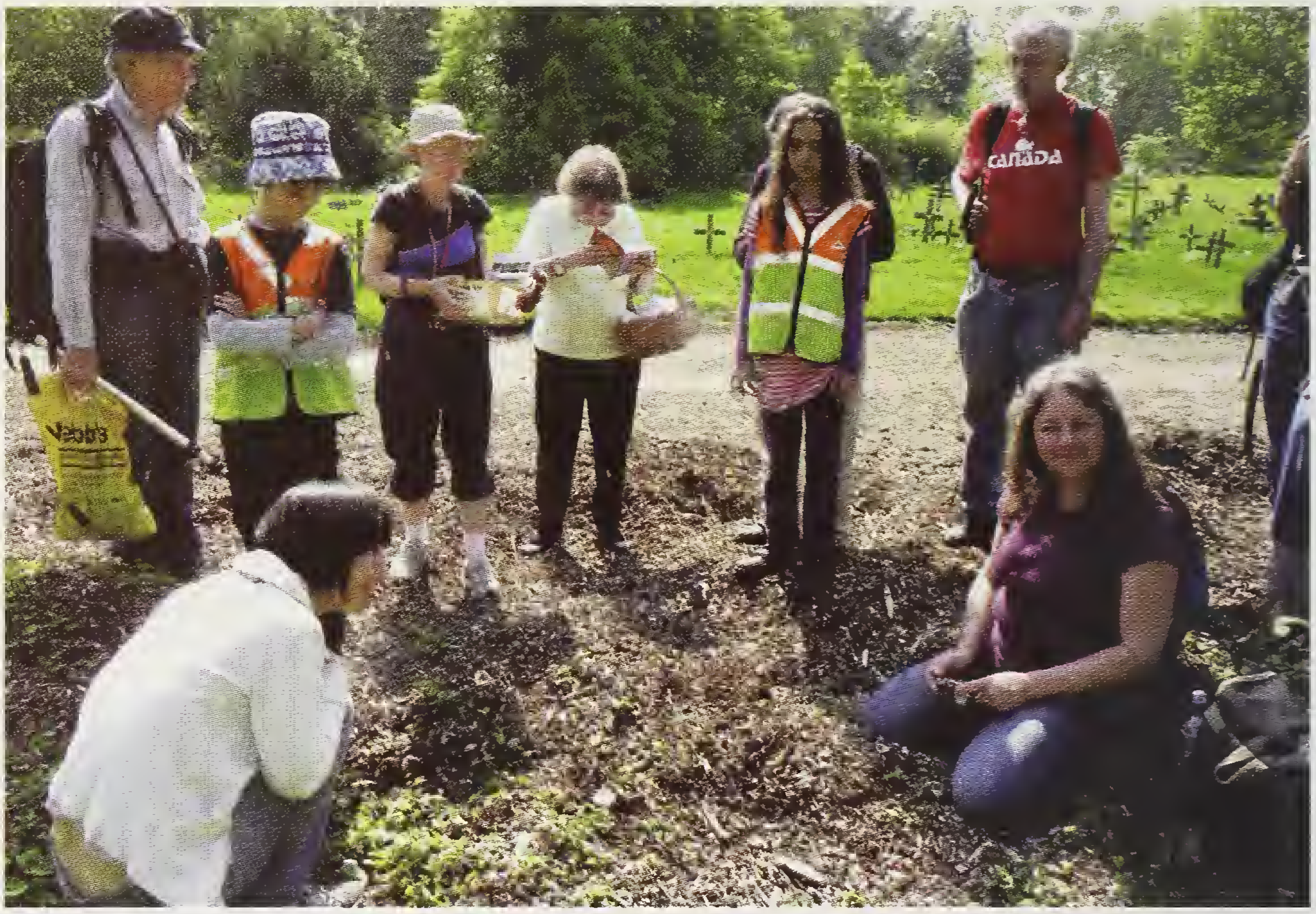


FIGURE 9. LNHS spring foray in East Finchley Cemetery, 2011. Jo Dubiel photographing fungi on woodchip mulch, a rich substrate for lignicolous species. Children are particularly good at spotting fungi and the more pairs of eyes the more specimens are found.

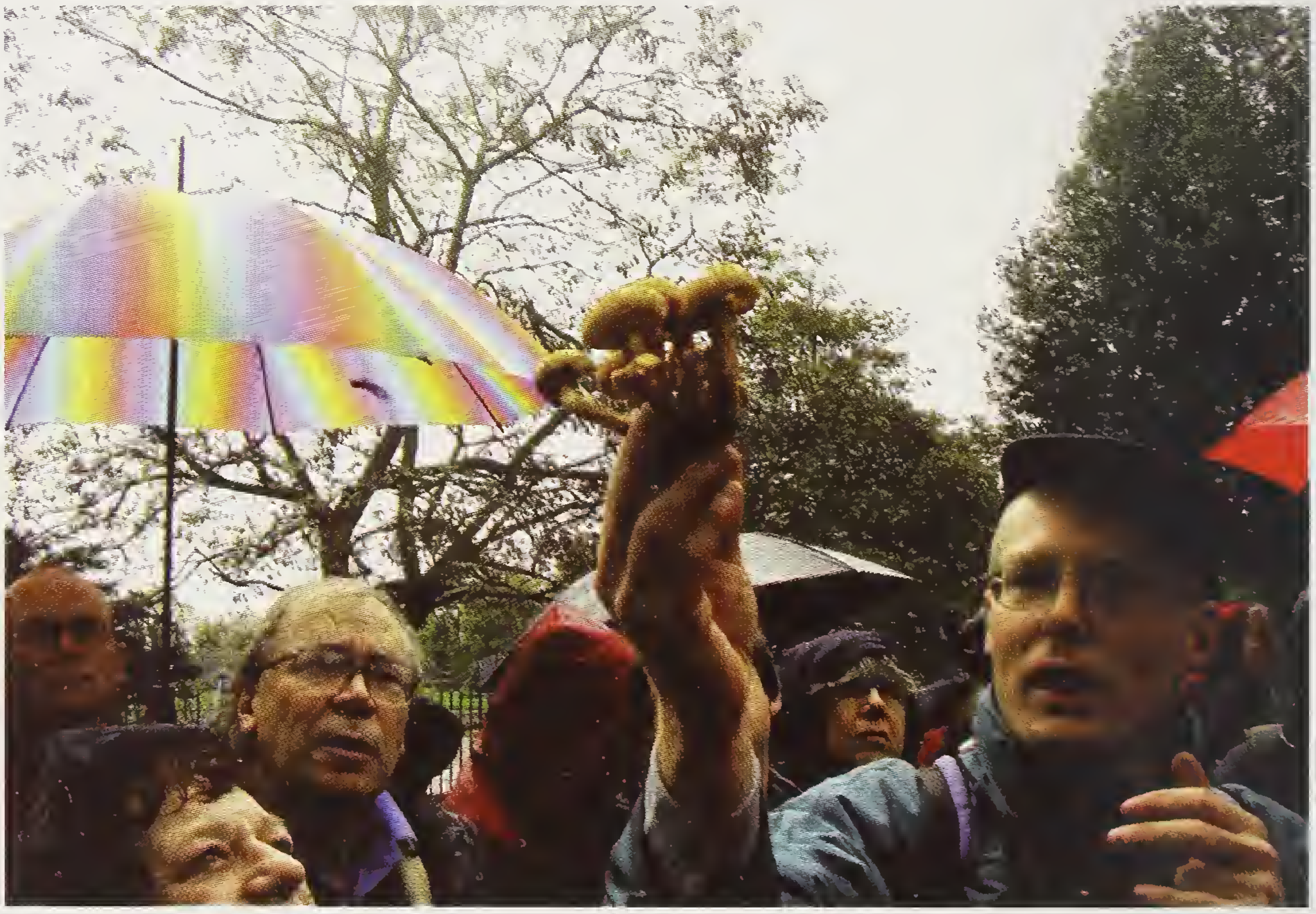


FIGURE 10. Keir Mottram holds up a clump of shaggy scalycap *Pholiota squarosa* to explain the finer points of identification. Autumn foray, 2010, attended by over fifty forayers. David Bevan (under the rainbow umbrella), our conservation officer, looks on.

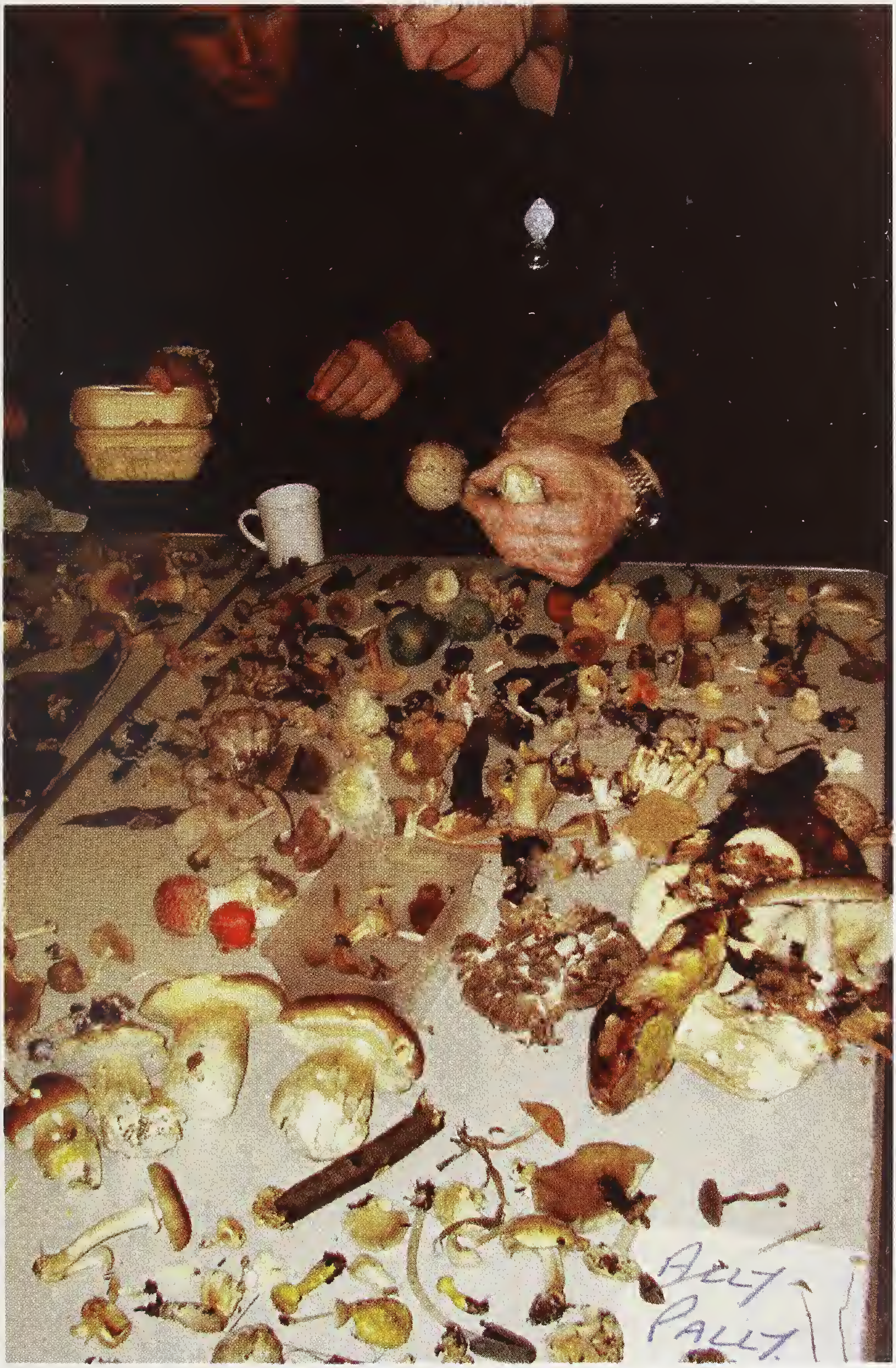


FIGURE 11. The specimens collected from one site — Alexandra Park — on our autumn foray in 2007. Notable are some large specimens of cep or penny bun *Boletus edulis*, the most sought after edible fungus in the world!

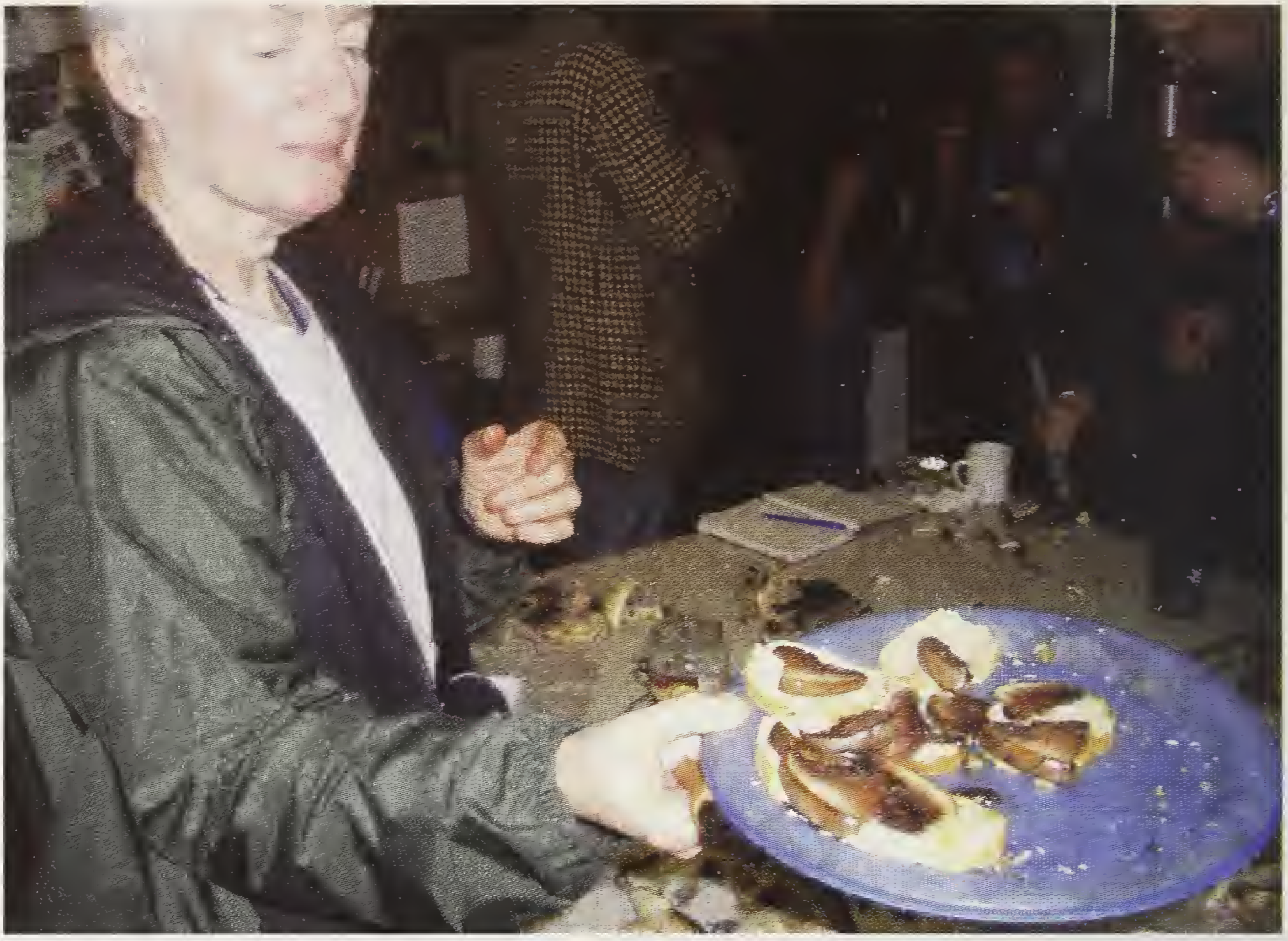


FIGURE 12a. Helen Thomas offering beefsteak fungus *Fistulina hepatica* fried in garlic butter on toast, a good esculent species. LNHS foray, 2008.

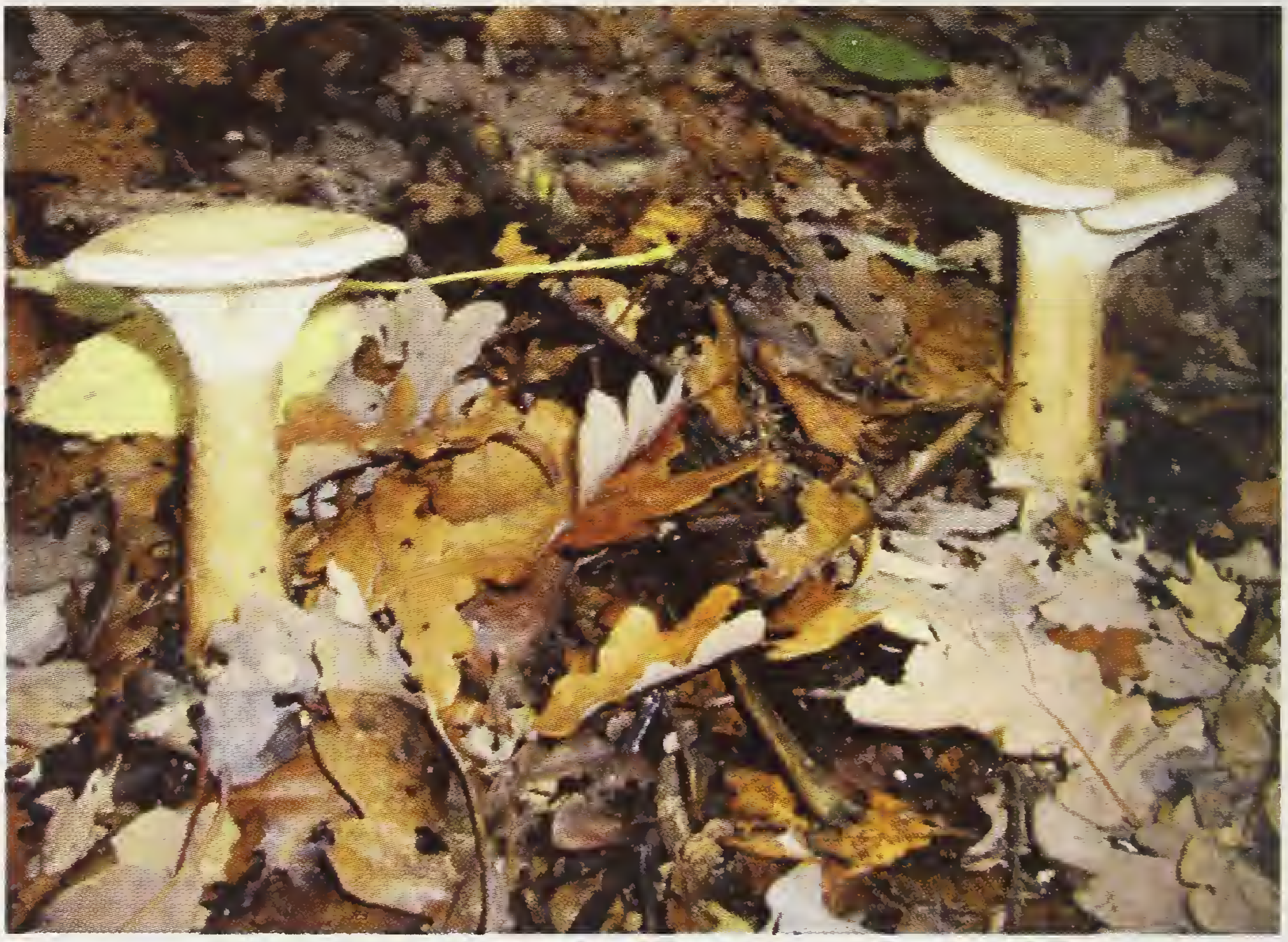
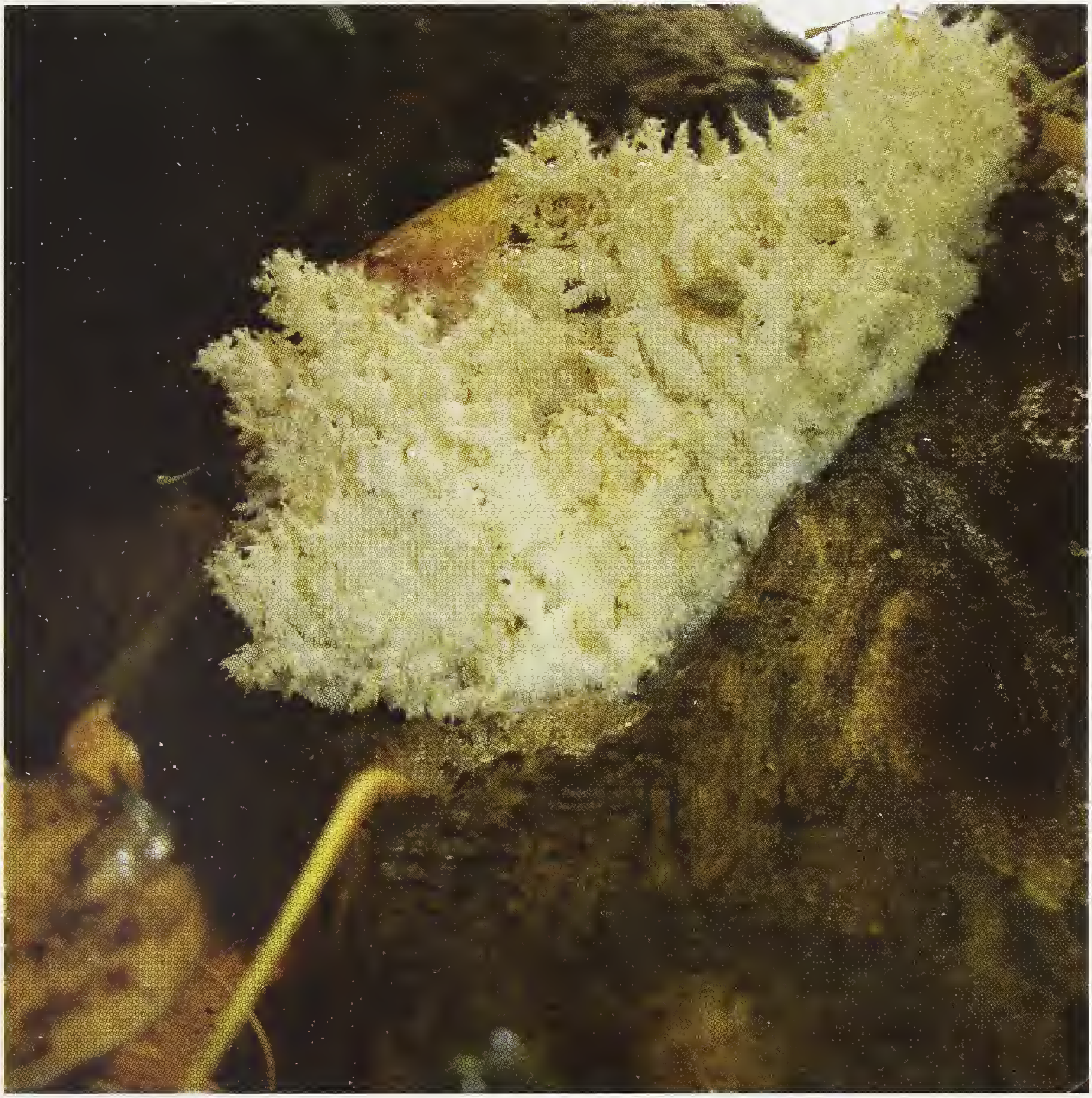
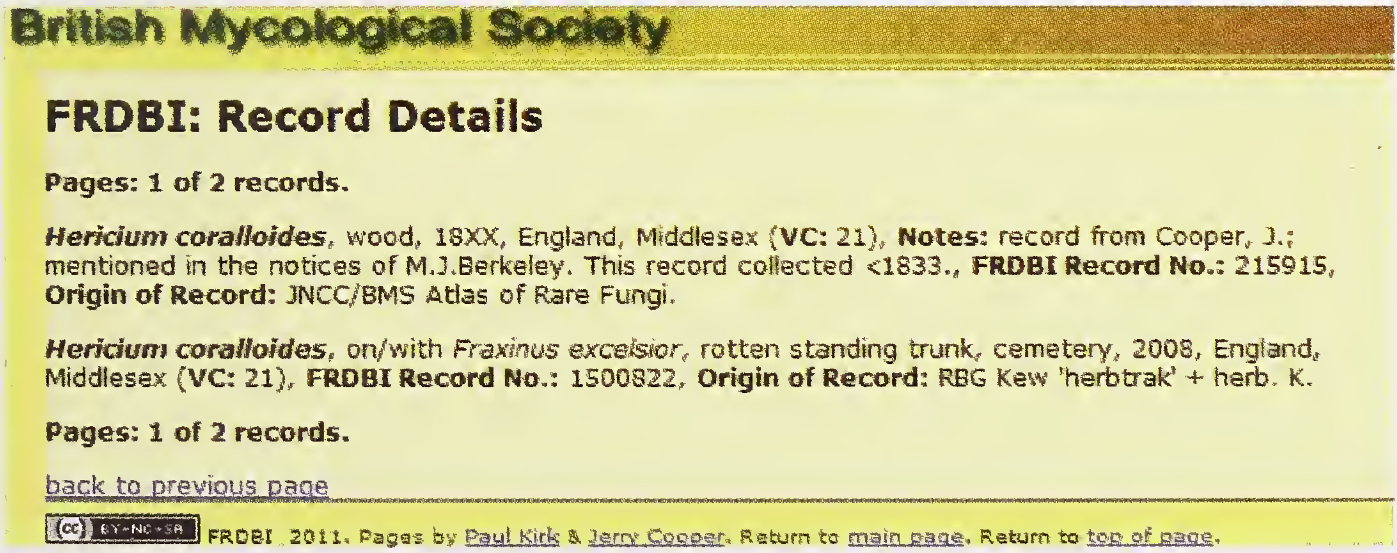


FIGURE 12b. Trooping funnel *Clitocybe geotropa* cap from Queen's Wood, also a fine esculent. LNHS foray, 2008.



A



British Mycological Society

FRDBI: Record Details

Pages: 1 of 2 records.

Hericium coralloides, wood, 18XX, England, Middlesex (**VC: 21**), **Notes:** record from Cooper, J.; mentioned in the notices of M.J.Berkeley. This record collected <1833., **FRDBI Record No.:** 215915, **Origin of Record:** JNCC/BMS Atlas of Rare Fungi.

Hericium coralloides, on/with *Fraxinus excelsior*, rotten standing trunk, cemetery, 2008, England, Middlesex (**VC: 21**), **FRDBI Record No.:** 1500822, **Origin of Record:** RBG Kew 'herbtrak' + herb. K.

Pages: 1 of 2 records.

back to previous page

(cc) BY-NC-SA FRDBI 2011. Pages by Paul Kirk & Jerry Cooper. Return to main page. Return to top of page.

B

FIGURE 13. A. Coral tooth *Hericium coralloides* on a rotten ash trunk in Tottenham Cemetery. B. FRDBI records for *H. coralloides* in Middlesex.

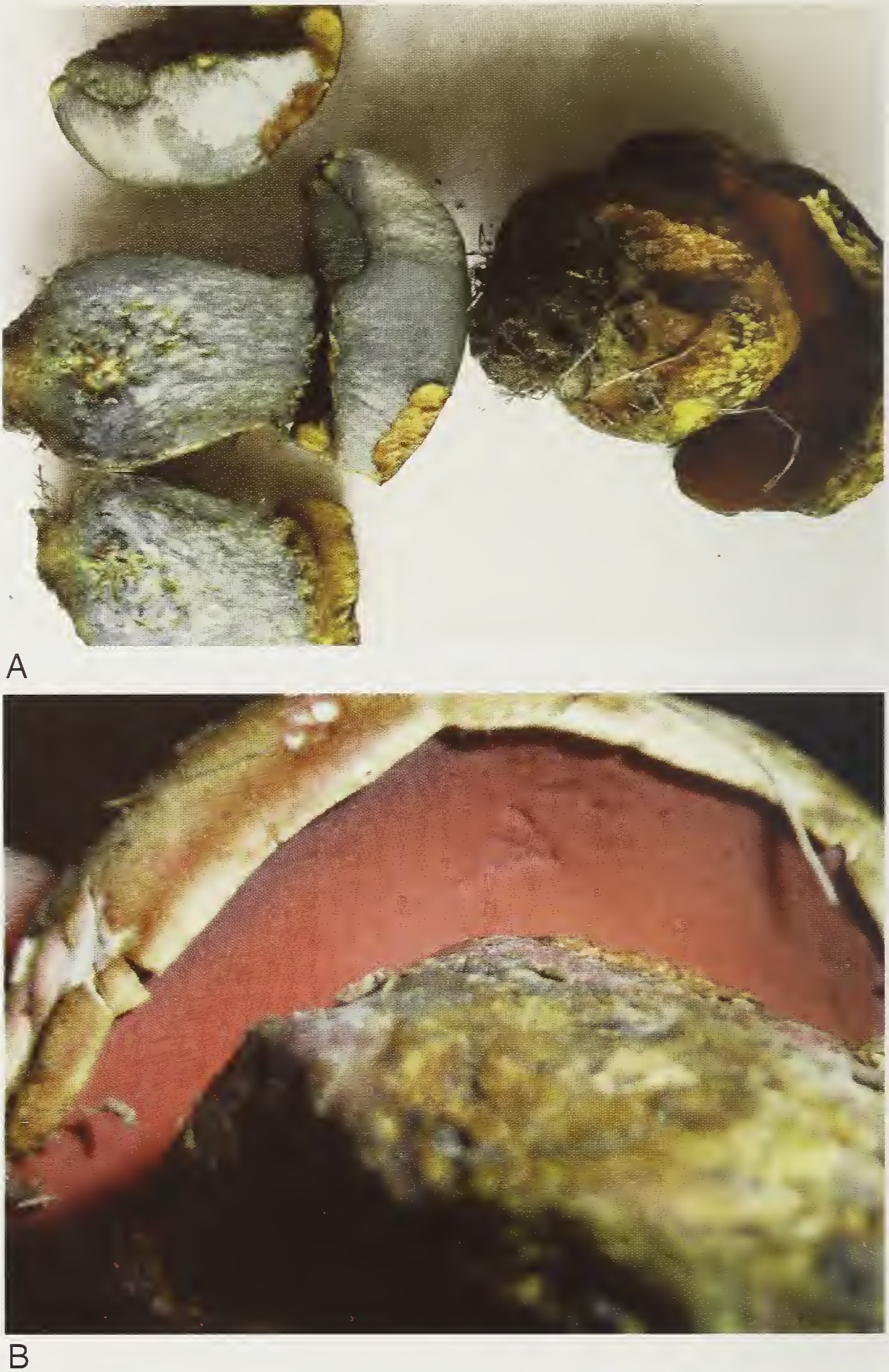


FIGURE 14. A. False Satan's bolete *Boletus legaliae*. Alexandra Park, 2011. Note red reticulation on stem and bluing on cut surface. B. Pores are tiny and a rich red colour.

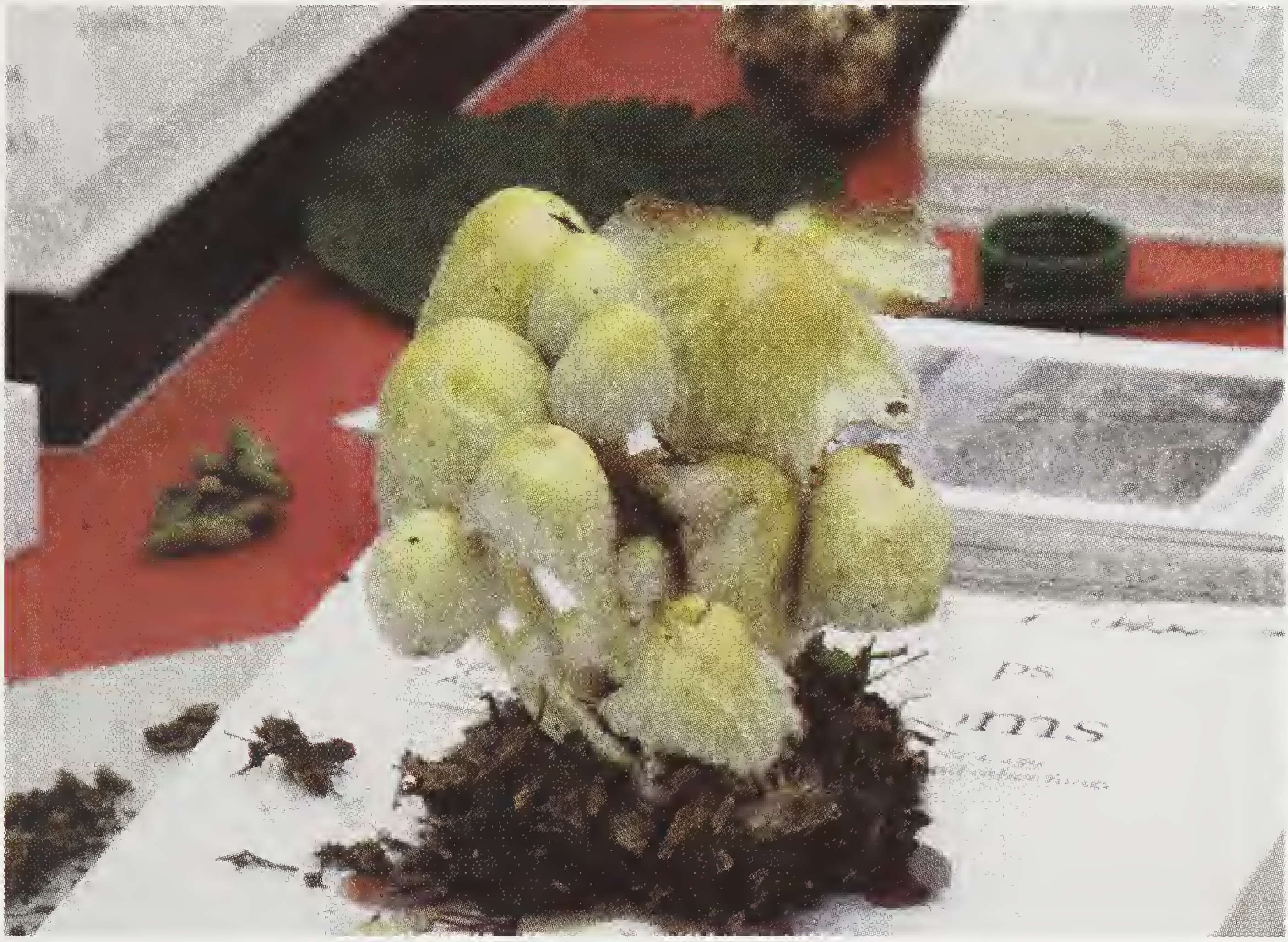


FIGURE 15. A large clump of robust yellowish sporocarps looking like yellow fieldcap *Bolbitius vitellinus* on steroids. Alexandra Park 'Bioblitz', 5 June 2010.

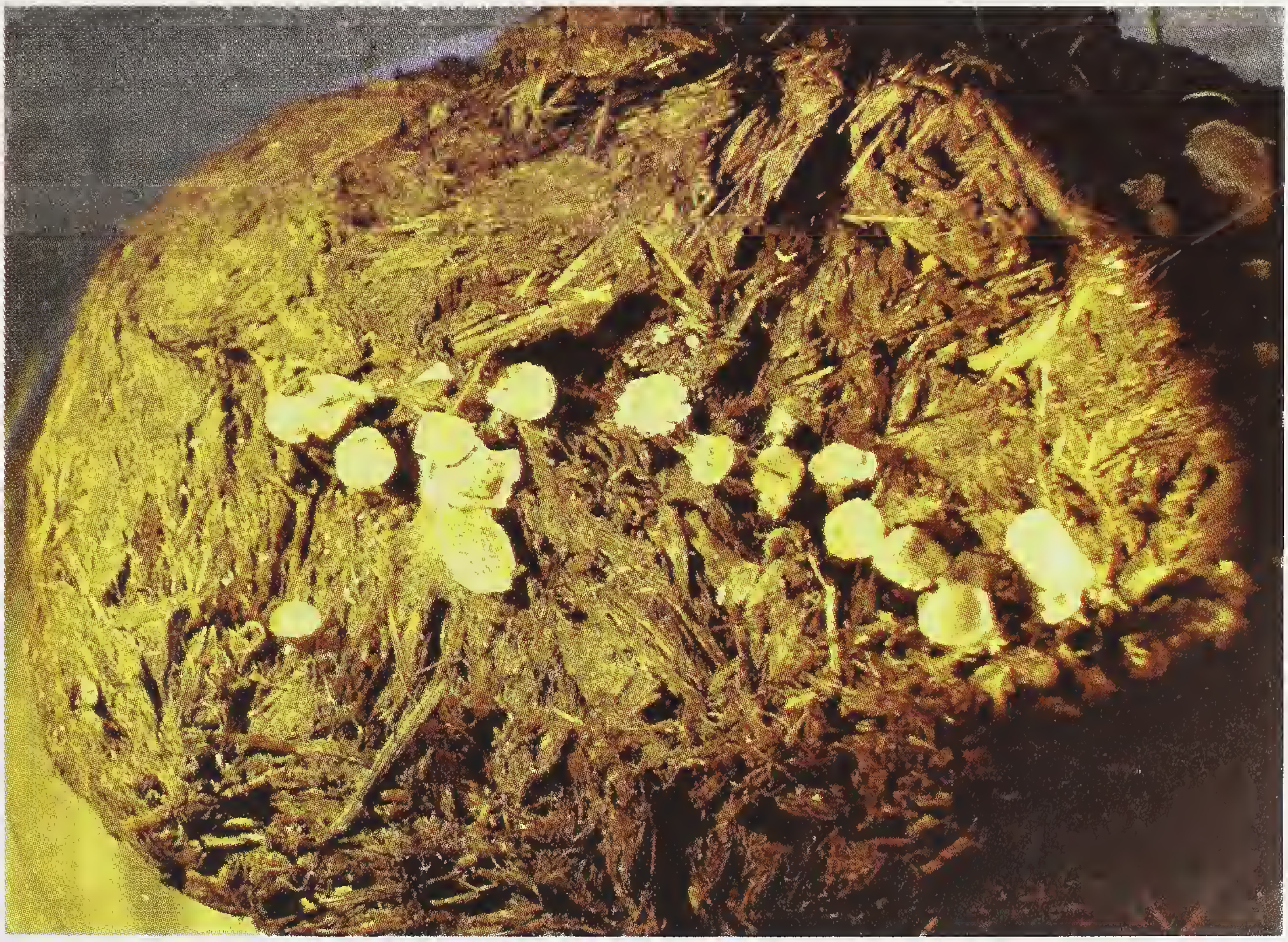


FIGURE 16. Nail fungus *Poronia punctata* on horse dung, undisclosed location, South London. *Photo: Mark Spencer*

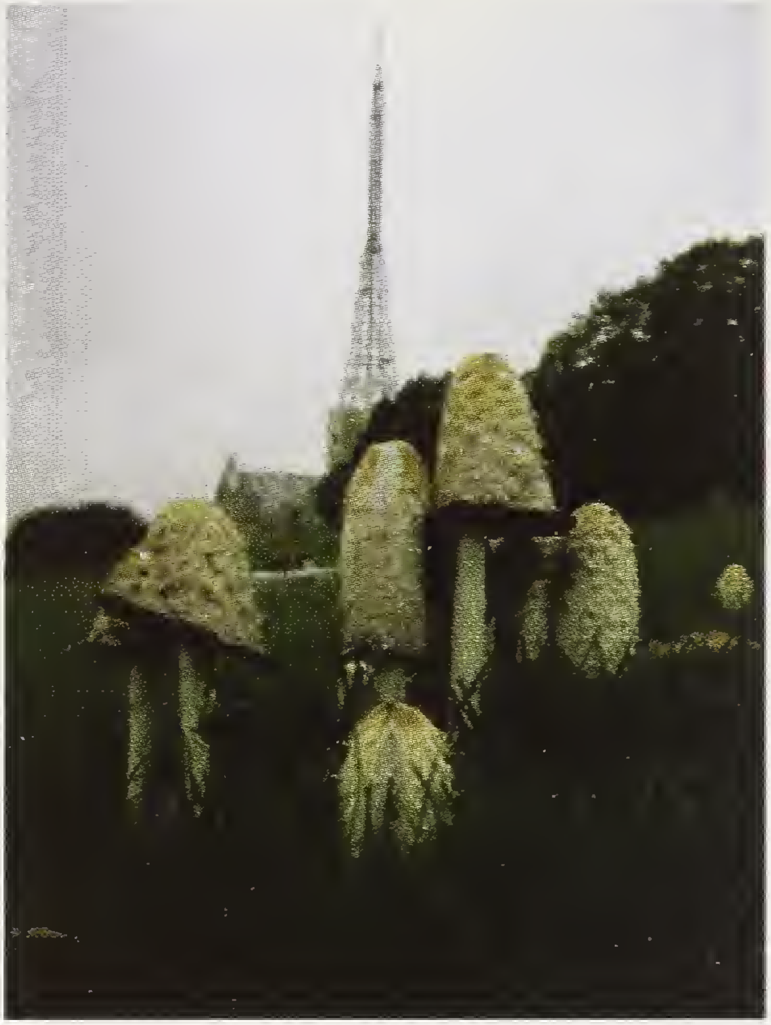
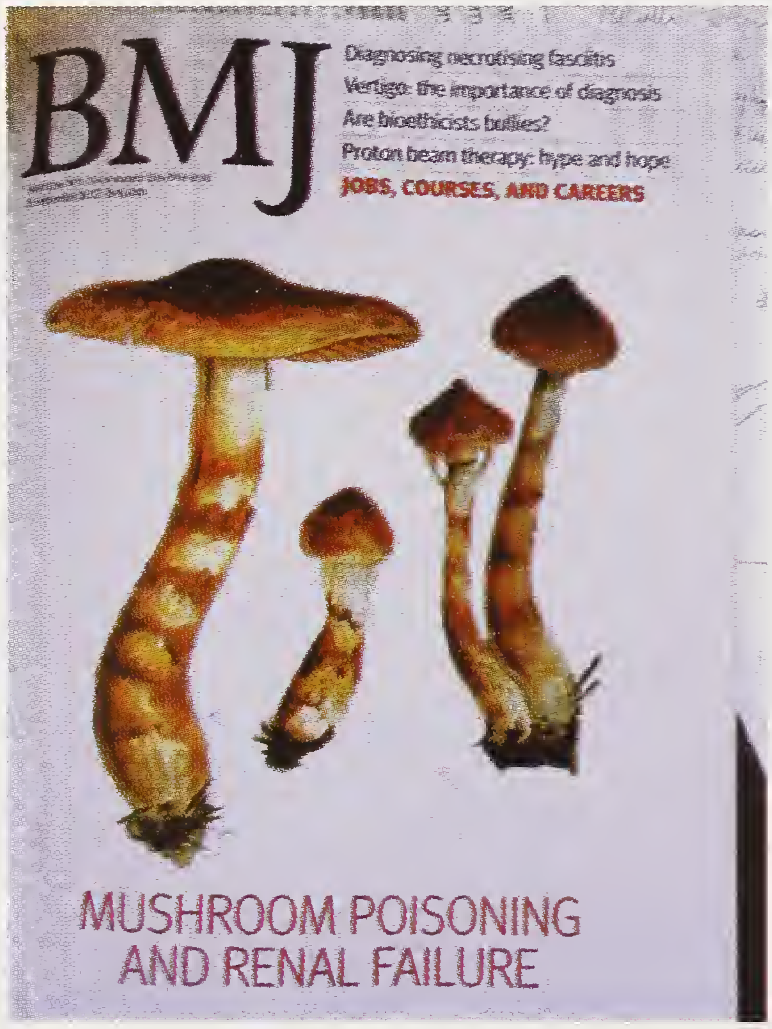


FIGURE 17. Lawyer's wig *Coprinus comatus*, Alexandra Park, with transmission aerial in the background. *Photo: Jo Dubiel*



BMJ

Diagnosing necrotising fasciitis

Vertigo: the importance of diagnosis

Are bioethicists bullies?

Proton beam therapy: hype and hope

JOBS, COURSES, AND CAREERS

MUSHROOM POISONING
AND RENAL FAILURE

FIGURE 18. Front cover of the *British Medical Journal* with Cooke's illustration of deadly webcap *Cortinarius rubellus*, consumption of which causes irreversible kidney failure.

Once collected for scientific and/or culinary purposes, fungi should be carefully separated and sorted. The law in Britain states that fungi may be collected with or without the permission of the landowner provided that it is done for the personal use of the collector and his family. Commercial collecting requires a licence in most parts of London, especially those under control of the City of London, such as Highgate Woods, Hampstead Heath and Epping Forest. This is no bad thing but does not take account of the fact that a high proportion of our native species require microscopic examination to be securely identified to species level (Figure 11).

It is essential to identify a fungus to species level before it is cooked and eaten. Indeed it is a measure of one's taxonomic confidence that one is willing to be put to the test by eating one's own collections. Every autumn the LNHS grand foray around four sites in Haringey is followed by a culinary experiment into the esculents collected, as certified by our fungal experts, who are the first to consume the selected taxa (Figure 12).

One's wanderings in urban spaces repeatedly turn up extraordinary fungi. The rule of birding that 'anything can turn up anywhere' also applies to fungi due to their extraordinary powers of dispersal. In 2003 two extreme rarities appeared on our autumn forays. The first of these was a relative of a common species, the oysterling *Crepidotus*. The usual one is grey and has the epithet *mollis*. But a less-common one that has only been recorded in Britain thirteen times prior to 2003 is the cinnabar-coloured oysterling *Crepidotus cinnabarinus* (Frontispiece). Cinnabar oysterling was impossible to miss when it appeared on a well-rotted ash log at the entrance to Alexandra Park, a few yards from the author's house. The other was the coral tooth *Hericium coralloides* of which the previous record in Middlesex dated to before 1833. The specimen was collected by the finder (Niki Reynolds) before the leader (ET) had recognized it as a Red Data list rarity. Having collected the specimen it seemed that it would be rude not to test its reputed esculence at the post-foray fry-up. Indeed it proved to be excellent as mentioned in all guides. It has reappeared in the same place every year since 2003 with one exception, so its chance to spread by spore dispersal has not been seriously affected (Figure 13).

There is in fact no evidence that collecting fungi in any quantity, commercial or otherwise, has any effect on abundance or diversity. In the only randomized controlled trial of this there was a slight increase in abundance on the plots that were commercially harvested.

London has some remarkable relicts of former land use that the wider countryside of south-east England has largely lost. Notable amongst these is ancient woodland and parkland with very old oak trees. A species that is now almost a London specialist is the strange oak root parasite, zoned rosette *Podoscypha multizonata* (Frontispiece). If one finds it one year it is likely to recur in exactly the same spot for many years thereafter. But not indefinitely as I have been able to observe at two sites in Alexandra Park where no fruit bodies have reappeared for the last three years having been always produced annually for the preceding ten years.

In summer 2011, as the warm wet weather began to do its magic on plants and animals, a remarkable number of tube fungi (boletes) started to appear under trees in parks and gardens. One such was *Boletus legaliae*, which fruited under a large oak in Alexandra Park about 200 metres from my front door (Figure 14). This handsome bolete had not previously been recorded from Middlesex, is uncommon nationally and is only recorded 150 times in the

Fungus Records Database of the British Isles(FRDBI) http://www.fieldmycology.net/ FRDBI/FRDBI.asp.

The database is one of the many superb online resources now available to mycologists, which alleviate the need to own an extensive (and expensive) personal library. Another resource that is invaluable to British mycologists is the *Checklist of the British and Irish Basidiomycota* (Legon and Henrici 2005), published in hard copy by The Royal Botanic Gardens, Kew and also available on line at http://www.basidiochecklist.info/. The checklist covers 3,100 taxa within the class Basidiomycetes, which is however only just over 20 per cent of all fungi reported from the British Isles (14,562) the balance being mostly Ascomycetes. The last comprehensive annotated checklist of our Ascomycetes (*The British Ascomycotina*; Cannon et al. 1985) is by now in need of an update. Any foray amongst the fungi can turn up taxonomic puzzles and life-time ticks.

The BioBlitz meeting which convened on 5 June 2010 produced a large clump of fungi found by Mark Spencer on woodchip that had us quite bemused. Although the smaller caps in the clump looked like yellow fieldcap, the usual examples of that species are very small and delicate and found amongst grass (Figure 15). Perusal of the January 2003 edition of *Field Mycology* turned up a note and photograph of a similar find at Kew on chainsaw shavings. The issue of whether this is a different species or the effect of substrate is unresolved and awaits DNA studies.

A rarity also found by our plant recorder Mark Spencer during his wanderings for the new flora of London is illustrated in Figure 16. The nail fungus was formerly common when horses were not treated with antibiotics. It has almost been eradicated by that means and only occurs now where the animals are living without benefit of veterinary attention, such as near traveller settlements.

Studying the fifth kingdom is an inexhaustible source of surprise and delight to those who enter its ever-expanding territory. Urban locations are as good as any in the country for finding and appreciating the abundance and diversity of our funga. This beautiful picture taken by Jo Dubiel well illustrates the juxtaposition of nature with an urban icon, the television mast at Alexandra Palace (Figure 17). Whether we will be more successful in generating interest in the fifth kingdom than were our illustrious predecessors, those of us who 'Foray amongst the funguses' (title of the first-ever organized fungus outing by the Woolhope Club in Herefordshire in 1868), will never cease to find new delights and intellectual challenges.

POSTSCRIPT

Shortly after finishing this article the front cover of the *British Medical Journal* for 8 September 2012 was illustrated with M. C. Cooke's own painting of one of the fungi he first described — *Cortinarius rubellus* Cooke, in *Grevillea* **16**: 44 (1887), deadly webcap, taken from his monumental eight-volume *Illustrations of British Fungi* (1881) (Figure 18). The occasion of this reproduction was the publication of a detailed personal account of renal failure induced by eating this species in mistake for *Boletus edulis* cep, written by Nicholas Evans, who together with his wife developed acute renal failure as a result and has now had a successful renal transplant with a kidney donated by his daughter (Evans et al. 2012). Certainly there are dangers in eating fungi, which can only be alleviated by better knowledge of simple taxonomic features such as the difference between tube and gill fungi.

Acknowledgements

The author is indebted for advice on identification to many colleagues, in particular Keir Mottram, Andy Overall, Geoffrey Kibby and Brian Wurzell. David Bevan encouraged him to take up leading forays and to take on fungal recording for the Society. All mistakes are his own.

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Book reviews

The Collins Nature Library

We have received the first three titles from the new Collins Nature Library, a series of classic British nature writing, reissues of long-lost seminal works. The titles have been chosen by Robert Macfarlane who has also written new introductions that put these classics into a modern context.

They are hardbound in matt buckram at royal octavo (234 × 153 mm) size, and with a colour photograph set into the front cover. They were scheduled for publication on 7 June 2012, priced £20 each; and also as eBooks.

1. ***Nature near London*** by Richard Jefferies was first published in 1883. For anyone not familiar with Jefferies, now is an opportunity to savour the countryside around London in Victorian times without having the leave your armchair. Each chapter centres on a special place, a certain species, a geographical feature or habitat — from orchards and copses, to rivers and streams, nightingales, crows, Brighton, Ditchling Beacon, Beachy Head, woodlands, heathlands, trees about town, and so on. ISBN 978 0 00 747901 6; 207 pp.

2. ***Adventures among birds*** by W. H. Hudson was first published in 1913. Members of the London Natural History Society will be familiar with Hudson's *Birds in London* (1898). He was born in Argentina in 1841, one of six children of immigrant American sheep farmers. After the death of his parents he left South America and settled in London in the mid 1870s, living much of his English life in Westbourne Grove. Like *Nature near London,* each chapter centres on a selected topic — 'Wells-Next-The-Sea, where wild geese congregate', 'The Sacred Bird' (the pheasant), 'A Tired Traveller' (the redwing), 'A Hampshire Village' (unnamed), 'The Immortal Nightingale', and 'The Ring-Ouzel as a Songster', these are a selection. Both these books transport us back to 'better', more-leisurely days. ISBN 978 0 00 746640 5; 253 pp.

3. ***A land*** by Jacquetta Hawkes was first published in 1951. In this seminal work the author 'paints a picture of the creation of Britain from the forming of the Earth's crust, through periods marked by the worlds of rock, water and air, to the emergence of living organisms that sense their surroundings. The worms and trilobites mark the beginning of the story of life that evolves through the great reptiles, dinosaurs and finally humans', to quote the publishers of this new edition. But they are right: this is a good opportunity to read again what became a best-seller when published in May 1951, to refresh one's knowledge of the history and shaping of Britain and its people from the first, lifeless, Pre-Cambrian rocks to the present time, all written largely in an easy personable style. ISBN 978 0 00 745746 5; 242 pp.

Keith H. Hyatt, Editor, *Lond. Nat.*

London's dynamic biodiversity

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Abstract

Three contrasting habitat examples — the Thames, the London Wetlands at Barnes and the Olympic site in the River Lea valley — are reviewed to demonstrate changes in biodiversity of a world city affected by continuing development and urban stress. Policy initiatives and actions which can impinge on habitats and species are briefly discussed. The three examples are chosen to highlight different degrees of ecological management. They give evidence of several benefits that have accrued to London's natural history, as well as some of the threats including those from pollutants and alien species.

Introduction

London is a green city. Its green areas can be extensive, such as the Royal Parks, or small but important, such as traditional orchards. The thirty-three London boroughs cover about 160 thousand hectares (ha), of which about forty per cent is green open space and nearly half of that is considered valuable as wildlife habitat. It also has a major river — the Thames — the largest continuous habitat in London and of much significance to biodiversity.

London's biodiversity is of particular interest. It contains thirty-six Sites of Special Scientific Interest (SSSIs) of which twenty-nine are designated for their biological interest and over 1,300 Sites of Importance for Nature Conservation (SINCs). It has two national nature reserves (Ruislip Woods and Richmond Park), while two of its World Heritage Sites (Kew Gardens and Greenwich Park) contain extensive areas of natural green space. It also has seventy-six local nature reserves. In addition, the range of habitats or land use types is wide, including acid grassland, woodland, hedgerows, marshland, churchyards and cemeteries, and canals, and of course private gardens among others.

As with other large cities its biodiversity is changing. The changes are driven by climate shifts, pollution, development, policy implementation, introduction of species, as well as by new attitudes and actions of the residential population and environmental organizations. There is a greater awareness of local biodiversity and an enhanced understanding of the real benefits it can bring to the quality of life (Henderson 2005).

Almost inevitably the process of continuing development in any city changes the habitat balance. In London, built-up areas (with associated gardens) cover eighty-seven thousand hectares but they are increasing, while other gardens and allotments (about 38,000 ha) are decreasing. Some habitats are relatively stable in extent, for example broadleaved and mixed woodland (nearly 13,000 ha) and wood pasture and parkland (2,000 ha). The eight Royal Parks which help give London its special character are protected and provide good habitats for biodiversity to flourish.

Many of the local natural reserves may be small, and some relatively new, but they are important to local communities and demonstrate how biodiversity can take a successful foothold even in the heart of the city. An excellent example is Camley Street Natural Park, one of the many reserves run by the London Wildlife Trust (see web sites below). It was developed at King's Cross in 1984 on the site of an old coal yard, occupying just under a hectare. It now has a flourishing biodiversity and runs educational and holiday play events.

Biodiversity is now much more on the agenda of London's public planning and managing authorities. There is a greater realization of its importance to the quality of life of the city dwellers and of visitors and tourists. It is of significance in education, air quality, environmental protection, climate change and recreation.

Habitats, species and monitoring

Much of this increased awareness and action stems from the Earth Summit held at Rio de Janeiro in 1992, especially the Convention on Biodiversity. The UK responded positively and established a working framework with the intention to have much of the work done at local level. A United Kingdom Biodiversity Partnership was established to implement the UK Biodiversity Action Plan or BAP. Local Plans were soon created; that for London currently has eleven action plans for habitats and eight for species that are important to the area. The habitats include chalk and acid grasslands, reedbeds, woodland, and the tidal Thames. Species include bats, reptiles, water vole, the stag beetle and mistletoe (London Biodiversity Partnership website). Reporting on the different plans with targets and achievements is through the UK's Biodiversity Action Plan Reporting System (BARS).

The BAR report for 'Acid Grassland' can be used as an example of the approach that is used. The stated vision for action on this habitat is 'to ensure the protection and optimal management of acid grasslands in Greater London, improve knowledge and awareness of its ecological value within the London region and involve Londoners with its conservation.' There were five set targets within this plan; one of which is 'to enhance the condition of 5 ha of London's acid grasslands by 2015 through improved management practices, and a further 35 ha by 2020.' (Two of the original targets have been abandoned primarily because of funding constraints.) Reports on actions follow. These are usually terse statements on the state of progress and reveal a very mixed degree of success — as is often the case with many of the habitat and species plans. But the overall system does appear to be working well, even if in places rather haphazardly, and London's biodiversity is being given greater consideration and protection than before the first Earth Summit.

The Mayor of London also has a statutory duty to produce a London Biodiversity Strategy. This was done in 2002 and is still in force. It links strongly with the London BAP, including the monitoring mechanism, but also with the Mayor's other strategies such as those on transport, waste management, noise, culture, etc. It thus complements the BAP. London boroughs also produce their own plans to deal with their specific biodiversity issues.

Other agencies and bodies give reports and advice on biodiversity. These include The Environment Agency, a Government body with a particular focus on rivers, floods and pollution. Its reports entitled *State of the Environment in London* are of particular interest. The 2010 report, for example, has a section on wildlife in which special attention is given to invasive non-native species, including the floating pennywort, Japanese knotweed and giant hogweed. Japanese knotweed is a particular current problem since its colonies covered about four hectares of the Olympic Park site and work started in 2007 on the difficult task of eradicating it. Invasive species can be costly and a continuing threat. The 2011 report was jointly produced with other organizations including the Greater London Authority and deals with water and air quality among other topics. It too briefly covers an invasive species — this time the Himalayan balsam (Greater London Authority, Environment Agency, Natural England and the Forestry Commission 2011).

Natural England is an independent public body that gives advice to Government and receives its funding mostly from the Department for Environment, Food and Rural Affairs. It reports on the state of London's SSSIs which in 2009 showed some variation with twenty-six per cent in a favourable condition, forty-six per cent unfavourable but recovering, twenty-four per cent unfavourable and four per cent (neutral grassland – lowland) declining or destroyed (Natural England 2009). Acid grassland is the largest area in the unfavourable category.

In some respects there is a plethora of initiatives, actions, reports and documentation on London's biodiversity. Some of the people working on the ground might wonder what it is all for when there is never enough effort being applied to the actual work of conservation and enhancement. The administrative load is partly a consequence of the policy to take the action at a local level while Government, its agencies and the Greater London Authority still keep control of some of the strings, including some important financial ones. It is also partly a result of the complexity of the biodiversity in London — but then this is a major benefit to the city's population.

Here we focus on three somewhat contrasting 'case histories' — the Thames, the London Wetlands at Barnes and briefly, mainly from the planning viewpoint, on the Olympic site in the River Lea valley. They have been chosen to illustrate many of the issues surrounding biodiversity in a large city (or megacity), including differing degrees of ecological management.

The Thames in London

Strictly the River Thames in London is not a river but an estuary, with tidal effects persisting as far west as Teddington. In fact, pragmatically, the Thames can be considered fresh water as far east as Battersea, because the average salinity is very low and classic freshwater fish like the carp, dace, roach, perch and pike dominate the local fish fauna. Salinity increases from Battersea to Gravesend, fluctuating with the tide, and of the freshwater fish only roach and dace persist and fish more typical of estuaries like flounder, mullet and smelt become more common. The Thames east of Gravesend is fully marine with a fish fauna typical of the North Sea.

From the biodiversity point of view, the aquatic fauna of estuaries is not very diverse but those relatively few species present are often high in abundance, because estuaries are typically productive, rich in organic carbon produced locally in the likes of salt marshes and eel grass beds or transported into the estuary from river or sea as detritus particles to be deposited as organically rich muds. Many burrowing invertebrates, including polychaete worms like the ragworm *Nereis diversicolor*, feed on the organic content of the mud like earthworms in garden soils, building up vast populations that represent a prolific and vital source of food for fish and invertebrate predators like crabs at high tide or for shore birds at low tide. Many of these predators represent passing trade, be they migratory birds on long transcontinental passage or fish like eels migrating up or down the estuary. Suspended particles in the water column of estuaries are similarly organically rich and present in high abundance, serving the nutritional needs of mussels and cockles on the bottom or of zooplankton, the animal component of the floating community in the water. Estuaries with their high productivity, therefore, also serve as breeding and nursery areas for young fish, like bass, herring or plaice in the Thames, or for invertebrates like shrimps and crabs, dependent on the local zooplankton, especially copepod crustaceans.

It should come as no surprise then that the intertidal mudflats and salt marshes of the tidal Thames are important sites for conservation, to protect local estuarine invertebrates and fish, but also, and not least, the wading birds that feed in profusion. For example, there are eight intertidal SSSIs within the area of jurisdiction of the Port of London Authority, the promotion of bird populations typically being the major reason for their designation.

Was it ever thus in the case of the Thames in London? The short answer is 'No', given the history of pollution in the Thames over the last 200 years, but the story of the last fifty years is heartening as life continues to return to what was a barren and evil-smelling aquifer through the throbbing metropolis of Victorian London (Wheeler 1979, Andrews and Rickard 1980, Wood 1982, Attrill 1998).

Prior to 1800, the River Thames in London supported an abundance of aquatic life with commercial fisheries for fish including river lamprey *Lampetra fluviatilis*, twaite shad *Alosa fallax*, smelt *Osmerus eperlanus*, flounder *Platichthys flesus* and eels *Anguilla anguilla*, and for invertebrates such as brown shrimp *Crangon crangon*, pink shrimp *Pandalus montagui* and oyster *Ostrea edulis*. Salmon *Salmo salar*, sea trout *Salmo trutta*, sea lamprey *Petromyzon marinus* and sturgeon *Acipenser sturio* could also be caught. But London was growing, from just over one million at the beginning of the nineteenth century to approaching three million mid-century, and in 1810 the water closet had been invented. Human waste now found its way in abundance into the Thames via its tributaries, and microorganisms degrading the organic waste used up the available oxygen in the water, producing an anoxic environment with no life present other than the bacteria themselves. Add increasing industrial pollution, including waste from coal gas production, and the scene was set for the Great Stink of 1858, essentially down to hydrogen sulphide emanating from the River Thames. Bazalgette subsequently delivered the much needed sewerage system with interceptor sewers carrying sewage to Beckton on the north shore by Barking, and to Crossness four kilometres downstream on the south bank. Conditions in the river improved but London was still growing, the population doubling again between 1880 and 1940. While worms like the blood worm

Tubifex costatus could survive in the organically rich and still predominantly anoxic sediments, there were no fish present as dissolved oxygen levels were low or non-existent, particularly in the summer, and birds shunned the shores of the Thames reaches.

The next phase of the rehabilitation of the Thames in London began in 1964 (Andrews and Rickard 1980), with an initial influx of invertebrates other than blood worms and of fish following the rebuilding of Crossness sewage treatment works. A second phase of rehabilitation and recovery of animal communities occurred between 1976 and 1980 after the commissioning of extensions to the sewage treatment works at Beckton. The river waters now contained dissolved oxygen, although summer decreases in oxygen levels thereafter continued to need attention through the seasonal use of a bubbler. The number of fish species recorded as present in the Thames in London (usually by collection on intake screens) increased to nearly a hundred from 1964 to 1979, with flounder and eels as early recolonizers, given their relative resistance to the combined stresses of reduced salinity and low oxygen. The return of fish to the Thames is epitomized by the estuarine fish the smelt *Osmerus eperlanus* (Wheeler 1979, Andrews and Rickard 1980). Fewer than ten individuals per year were recorded by Wheeler (1979) at West Thurrock power station between 1968 and 1973, but more than 1,000 were collected in a single hour at the power station in November 1979.

A stable invertebrate community returned coincident with the fish. Other oligochaete worms less typical of organic pollution joined the blood worms, as did polychaetes (notably *Nereis diversicolor*), isopod and amphipod crustaceans, gastropod molluscs and the shore crab *Carcinus maenas*. Breeding populations of brown shrimp *Crangon crangon* returned, as well as of two prawns *Palaemon longirostris* and *P. serratus*. Invertebrate diversity and abundance has continued to increase apace since 1979, and the Thames now supports a rich assemblage of benthic macroinvertebrates over much of its passage through the London area (Attrill 1998). Waterfowl and waders have returned to the Thames from the late 1960s, as the new species-rich macroinvertebrate fauna can supply the various needs of the diets of the individual species.

Biomonitoring programmes confirm that the bioavailabilities of classic anthropogenic contaminants, such as pollutant trace metals, are decreasing in the Thames, as effluents are regulated and industry changes. Previously high availabilities of silver, for example, in the Thames were associated with discharge from the photographic processing industry, now replaced by the world of digital photography. Also apparently falling are local bioavailabilities in the Thames of manmade chlorinated organic compounds, be they agricultural pesticides like atrazine and lindane or polychlorinated biphenyls (PCBs), introduced as insulators but now notorious as toxic agents as a result of Rachel Carson's 1962 classic work *Silent Spring*.

Although the worst of the anthropogenic pollution of the Thames is hopefully behind us forever, we do continue to introduce nutrients from periodic discharges of untreated sewage via storm drains at times of heavy rainfall and from fertilizers added to agricultural land upstream with the coincident risk of eutrophication and subsequent reduction in oxygen levels. Endocrine disruptors in the form of hormones (for example from contraceptives) and their mimics represent ongoing risks, as do newly emerging man-made contaminants such as flame retardants (polybrominated diphenylethers, PBDEs), the toxic properties of which are only now becoming apparent. Metal-rich nanoparticles may represent a new threat, for example, as consumers purchase the likes of socks treated with silver-rich nanoparticles to counter the bacterial action that causes foot odour, and the same nanoparticles are added to washing machines for these same bactericidal properties.

So far, so good, so long as we continue to be vigilant. Fish are returning. The number of species in the Thames is now about 120 strong, with approximately twenty freshwater species, fourteen estuarine species coping with both salt and fresh water, and eighty-six marine species lower downriver. The list includes flagship species like the salmon *S. salar* which returned to the Thames in 1974 after 150 years, and two rarities, the twaite shad *A. fallax* (a relative of the herring) and the sea lamprey *P. marinus*, both fished commercially prior to 1800 and now spawning again in the tidal Thames. A protected invertebrate in the Thames in London is the tentacled lagoon worm *Alkmaria romijni*, a tiny polychaete worm less than five millimetres long but particularly in danger from loss of habitat such as coastal lagoons.

A return to health of the River Thames has brought with it a new threat in the form of invasive aliens, aquatic species introduced, usually by anthropogenic means, to grow far from home with the potential to disrupt any existing ecological balance in the local aquatic community.

A now classic example of such an alien in the Thames is the Chinese mitten crab *Eriocheir sinensis* (Figure 1). The crabs spend most of their lives in fresh water prior to the migration of reproductively mature adults down to estuaries to breed, and release planktonic larvae to develop in the estuary, before the juvenile crabs migrate upstream along the bottom, periodically riding the incoming tide. The crabs cause considerable environmental damage in

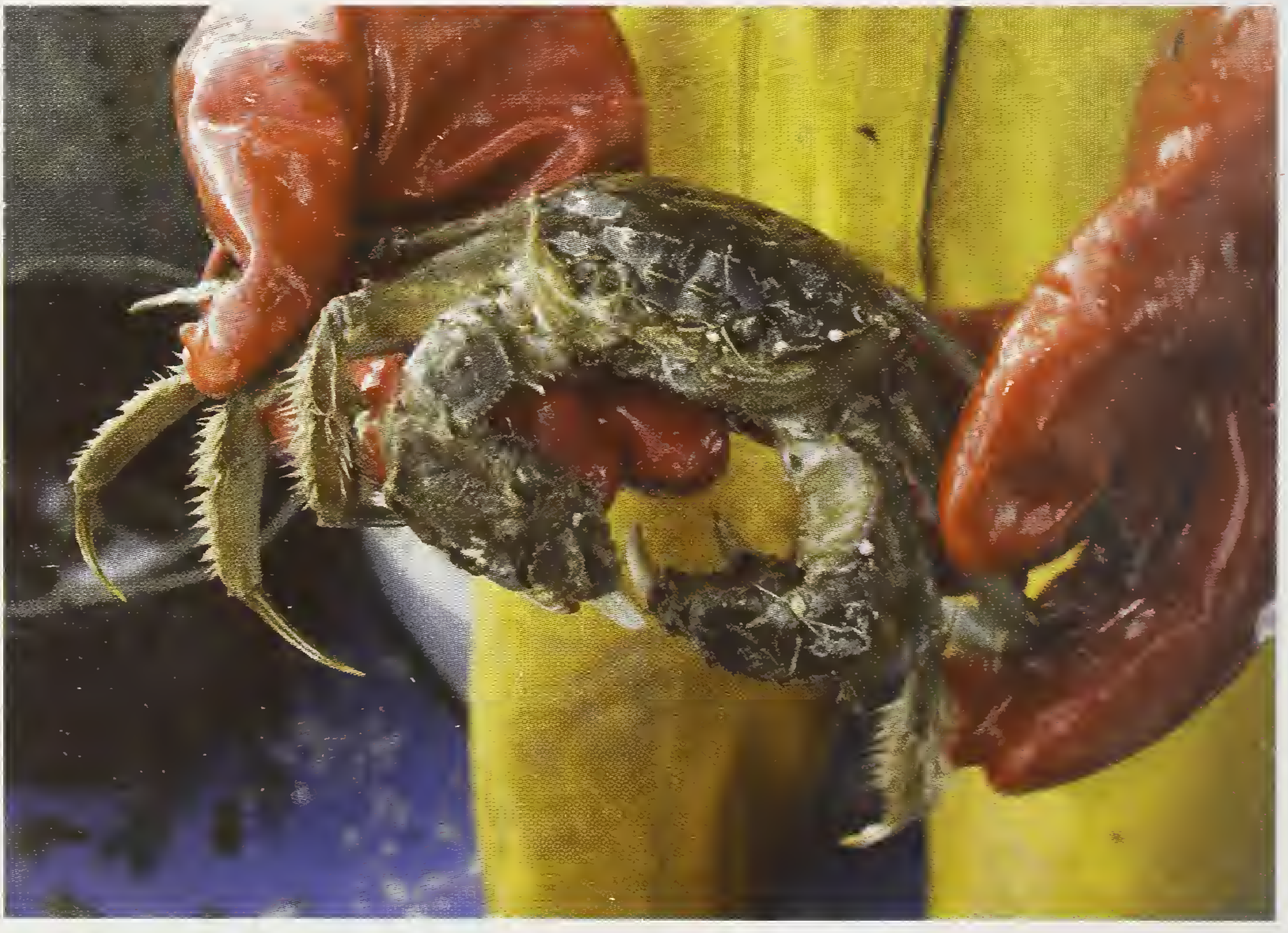

FIGURE 1. Chinese mitten crab *Eriocheir sinensis,* caught at the site of the Old West Thurrock Power Station, River Thames, 18 June 2006.

Photo: Phil Hurst, Natural History Museum freshwater habitats; they burrow destructively into earthworks and disrupt local food chains as large aggressive omnivores. The mitten crab was first recorded in Britain in the Thames Estuary in 1935, but the Thames population only became established initially in low numbers in the 1970s and 1980s, perhaps in correlation with the clean-up of the river. In the 1990s, the Thames population of mitten crabs increased dramatically and this population explosion has been maintained through the first decade of this century (Clark et al. 2009). In its native Far East, the mitten crab is a delicacy, and the gonads of sexually ripe crabs at the time of the yearly autumn migration downstream fetch high prices in local restaurants. There is a potential commercial market in London for this delicacy, and harvesting for culinary purposes might offer a cost-effective potential control mechanism to reduce the numbers of this environmentally disruptive alien crab in the Thames catchment (Clark et al. 2009). We need, however, to ensure that any harvesting of the crabs does not affect the eel fishing industry of the Thames, presently under considerable stress.

Another alien invader from the east, the freshwater Asian clam *Corbicula fluminea* was discovered in the Thames at Teddington in 2004, and has since been found in high population densities down to Battersea (Elliott and zu Ermgassen 2008). Like a third more long-term alien invader of the Thames, the zebra mussel *Dreissena polymorpha*, the Asian clam may have an economic impact by fouling the cooling water intake pipes of local industrial facilities. The water filtering powers of each of these bivalves in high density will clear water bodies of phytoplankton and suspended detritus, enhancing light penetration and may therefore affect freshwater plant life with knock-on effects for the local aquatic biological community including fish (Elliott and zu Ermgassen 2008). The London Rivers Action Plan of 2009 is a collaborative project involving the Mayor of London, the Environment Agency, Natural England, the Thames Rivers Restoration Trust, WWF-UK, the London Wildlife Trust and the River Restoration Centre to facilitate a programme of river restoration across London to deliver 2015 and 2020 London Biodiversity Partnership and London Plan targets for river restoration and enhancement. The action plan recognizes that the River Thames is an iconic symbol of London. Amongst the key aspirations are the enhancement of habitats for the conservation of river wildlife and the reconnection of people to the natural environment, recognizing the importance of the latter in improving our mental well-being.

WWT London Wetland Centre

This impressive area, full of biodiversity interest, is situated on the southern side of the Thames at Barn Elms, Barnes. It is run by The Wildfowl & Wetlands Trust and was developed on the site of redundant Victorian water reservoirs. In contrast to the Thames itself, its biodiversity is much more managed. The aim was to create a Centre with several habitats to encourage a suitable range of plants and animals, some of which were present during the existence of the reservoirs, and also to have an accessible, informative, and enjoyable place for a visiting public.

It occupies an area of just over forty hectares, contains a wilderness area of thirty-one hectares and yet is only four miles from Westminster. It is under a flight path of aircraft using Heathrow Airport (nine miles away), is less than a mile from one of London's arterial roads (the A4), and can occasionally share some of the possible hyper-eutrophic problems suffered by the Thames. Its interest lies then not only in the biodiversity that it contains but also in the challenges of its initial development and sustainability.

Its construction was a significant challenge itself. Planning restrictions required the use of all existing soils and the reuse of much of the materials, such as concrete, of the original water reservoirs. A variety of habitats and six soil profiles were needed for the different species. Several, controllable water levels were also required. Safe and non-intrusive access for the public had to be designed. All of this had to be achieved whilst being sensitive to the existing wildlife (Peberdy 1998, Branson 2000).

The Centre opened in 2000 and the first visitors, whether public or birds, would see or experience six main units — a deep-water reservoir lagoon, reedbeds, a wader scrape, a main lake with water of varying depths, a sheltered lagoon, and a grazing marsh. Thirty different wetland habitats were created for different species and included shingle islands, wet grassland and woodland. In some cases habitat development was down to a small scale, requiring them to be constructed by hand. Sluices were employed to control the water levels. Over 300,000 water plants and 27,000 trees had been planted.

The current diversity of wildlife at the Centre can be described as very good. Besides the birds, it hosts bats, amphibians, scarce plants, snakes and slow worms, and many types of insects. The number of bird species has increased since the time of the reservoirs from about 130 to 161 in 2009. Other increases in species numbers include bats, from five to eight, reptiles and amphibians, from five to eight, and for plant taxa, from 192 to over 440. The Centre is an SSSI because of its over-wintering numbers of shoveler (225 peak maxima counts, five-year mean) and gadwall (155) as well as its wetland breeding birds. These are good indicators of success.

Inevitably there are many site-management tasks to help optimize the habitats for certain taxa. For example, the reed beds are cut to encourage wintering bitterns, while the dense regrowth in the spring benefits the water voles. Predators are checked or targeted, especially to exclude the American mink (last detected in 2008–09) and foxes, which are troublesome to breeding waders. Invasive non-native species such as the large-flowered water primrose *Ludwigia grandiflora* must be kept under control, with the plant successfully eradicated in 2010. Hyper-eutrophication, on the other hand, is a less predictable issue but has not yet caused significant long-term problems for the Centre. Excessive amounts of phosphate in the Thames during a period in 2004 had the knock-on effect of blue-green algal blooms developing in the Centre's waters with a deleterious impact on the macrophytes. Examples such as these are fortunately now rare.

It is the significant numbers of water-bird species that give the Centre its special attraction, although they comprise only about half the total number of bird species recorded. The water-bird population numbers are often significant, with breeding pairs, such as for the gadwall, pochard and tufted duck. The occurrence of the bittern — currently averaging over three each year — is a particular highlight. Common snipe, water rail and grey heron numbers are also good. Forty-seven bird species now breed at the Centre, including the threatened sand martin which now has some eighty breeding pairs in the artificial nesting site built in 2003. This contrasts with 1991 when only twenty-eight breeding species were recorded. Up to 180 bird species will be at the Centre in a good year, of which over 150 will be wild birds. Only a very few bird species are faring less well in recent years, an example being the little ringed plover with poor successful breeding numbers.

Fish were allowed to colonize rather than be introduced. About ten species now occur, including eel, perch, gudgeon, roach and stickleback and these provide food for the herons, grebes and cormorants. In contrast, the Centre has undertaken a major project on the introduction of water voles as part of a national conservation plan led by the Environment Agency. Nearly 150 were released in 2001 followed by regular and continuing monitoring. The site has the capacity for over 200 voles in the summer and usually has good sighting numbers in April and May. Evidence suggests that numbers are at least being maintained and there is the possibility that the Wetlands could be a source for dispersal of voles beyond the boundaries.

Relatively high population and breeding numbers exist for the common frog, smooth newt and the common toad, a UK BAP priority species. Bat numbers are of at least regional significance and with two nationally rare species (Leisler's bat and Nathusius's pipistrelle) and two UK BAP priority species (noctule and soprano pipistrelle). Butterflies, dragonflies and damselflies are monitored. Dragonfly and damselfly species increased from twelve in 1996 to seventeen in 2004 and then levelled off until nineteen were recorded in 2010. However population numbers are not always so consistent. For example, the common darter dragonfly colonized the site quickly and then declined rapidly over a five-year period for no apparent reason. More than half the UK's thirty-nine species of dragonfly and damselfly have now been seen, with up to seventeen species breeding. Grass snakes, common lizards and slow worms are all doing well. The Centre also contains some nationally scarce or uncommon plants such as Jersey cudweed, marsh dock, yellow bartsia, fritillary and hairlike pondweed.

These summary statements about some of the Wetlands' habitats and organisms illustrate the dynamic nature of this biodiversity and of what can be achieved in an urban environment. Its success is also reflected in the number of paying and WWT member visitors — usually around a quarter of a million each year — and the uptake of its educational and schools programmes around 25,000 visitors a year. The Centre's funding derives almost exclusively from its admission and membership income, and secondary spend in the shop and café. Further limited support comes from external sources such as charitable trusts and statutory bodies, and has included the Environment Agency (on an annual bid basis) and, until 2011, the Greater London Authority. It contributes to the London BAP through its own biodiversity activities but also through the contribution of staff expertise and time to the management and monitoring of some action plans. In this the Biodiversity Officer post has been a key one. It provides the necessary on-site expertise, can give a knowledgeable focus on both the day-to-day as well as the longer-term issues, and aids the integration of the Centre's activities with wider conservation planning.

On a good day one can look down from one's seat in the aircraft coming into Heathrow and see clearly the several, different green areas that comprise a significant part of the landscape: Syon and Richmond Parks, Kew Gardens, Hounslow Heath and the London Wetland Centre itself. Royal heritage has played a large part in this scene but in some contrast the Centre has arisen from the vision and determination of one man, Peter Scott, the founder of The Wildfowl & Wetlands Trust and its Wetland Centres, and his enthusiastic followers. Its continuing success is a testimony to the importance that people give to biodiversity and for biodiversity to be very much part of city life.

Olympic Games site

The hosting by London of the 2012 Olympic and Paralympic Games has provided a fine opportunity to transform an area of contaminated and derelict industrial land into an urban park designed for sport, recreation, and for the development and appreciation of biodiversity. If the Wetlands Centre at Barnes is an example of a biodiversity initiative that focuses on the creation of a centre for wildlife and to which the public can then visit, the Olympic development is one which shows how biodiversity can be integrated into a major public programme.

The chosen location is on the River Lea (or Lee), about four miles east of the City of London. Waltham Forest is immediately to the north and Tower Hamlets to the south. The river runs through London to the tidal Thames at Leamouth. Its valley contains country parks, some nature reserves and heritage sites. The adjacency of a river and a park to a land area in great need of remediation was undoubtedly a major advantage to the plan to ensure sustainable development of the local biodiversity. If planners of Olympic sites in major cities wish, as they ought, to include a significant and desirable biodiversity component then the choice of site is obviously critical. London seems to have made a good one.

Unlike the Barnes Wetlands the task has been to manage the biodiversity to satisfy two timing requirements — one for the relatively short period of the Games, the other for the long-term access by the public. For the former there is the planting of numerous trees, shrubs and plants to give, among other things, the desired green impact at the moment of the opening. One example is the creation of a wild-flower meadow with the flowers chosen so that they open on time. For the latter there is habitat development that deals with larger issues such as flooding and the conservation of species, especially those which feature in the London Biodiversity Action Plan.

From the start the Olympic Delivery Authority (the body established to ensure that the Games run successfully and with a suitable long-lasting legacy) was obliged to produce a biodiversity action plan for the Olympic Park. Published in October 2008 it deals with the key issues of enhancing biodiversity through the establishment and conservation of habitats, the conservation of selected species, and appropriate monitoring and reporting mechanisms. It deals also with the issue of biodiversity ‘compensation’ over that lost during site remediation. The BAP has always been a central part of the planning. By 2014 the target to create forty-five hectares of suitable habitat should have been reached.

The plan has ten habitat categories — built environment, parks and related space, allotments, brownfield areas, species-rich grassland, trees and scrub, wet woodland, rivers, reedbeds, and ponds. Of these, species-rich grassland and trees and scrub cover a major part (some thirty-four) of the forty-five hectares. The approach to the chosen habitats takes account of the London BAP and attempts to include opportunities for encouraging wildlife wherever reasonably possible in a complex development. For example, the built habitat incorporates plans for bird nests and bat boxes, as well as extensive areas of living roofs in the Olympic Village and other sites. Trees which are native and likely to be more resistant to climate change, such as oak, ash, and London plane, are being planted. Habitats are planned to have that all-important property of being contiguous. They should also require minimum intervention after the Games are over.

In addition to one for bats there are some twenty-seven other species plans. These include several terrestrial invertebrates, the common toad, the smooth newt, several birds (including the black redstart, kingfisher, linnet, reed bunting and sand martin), water vole and otter. The poplar tree is included but there are no other plants. The choice is based in part on some earlier survey work, for example those of invertebrates in 2006, and in part on what species are likely to occur and thrive in the available habitats. In addition to the selection of species in the plan, planting trials over a period of one year have shown which species of plants in wetland conditions will thrive under the special circumstances of the site.

The early stages of site preparation and development involved major works, especially on remediation of heavily contaminated groundwaters and soils some of which would need to be suitable for long-term sustainability of plant life. Contaminants accumulated over numerous decades of industrial activity, such as arsenic, lead and copper, as well as organics such as polycyclic aromatic hydrocarbons, require specialist treatments involving soil washing, bioremediation and chemical stabilization (Cole and Lynch 2010). It is claimed that 80 per cent of the soil has been retained and reused.

The existing biodiversity had to be considered. Species (fish, toads and newts mainly) have been translocated until habitat work is finished, while protection has been given to some priority plant species (e.g. toadflax brocade) found in some of the initial brownfield areas. Invasive species, including Japanese knotweed, Himalayan balsam, floating pennywort and giant hogweed had to be removed or at least contained. Engineers and ecologists have had to work closely together.

At the time of writing there are still some months before the Games start and before the Park will be fully accessible to the public in 2014. Although there is work still to be done, the biodiversity element is said to be on schedule and progressing well. There are critics of some of the actions, for example on the efficacy of translocation of animals, but the procedures and plans regarding biodiversity seem at least reasonable and could well set a benchmark for other major urban developments.

For those of us watching from the sidelines the issue of sustainability is of particular interest. The plans are laudable and should, in principle, be feasible, but much will depend on the management and investment of money and effort in site restoration after the Games and in the appropriate maintenance of the habitats. We have insufficient knowledge of the likely stresses on the environment (Wilby and Perry 2006) including such factors as air and water pollution, invasive species, water levels, and the density and behaviour of the visiting public. The *Commission for a Sustainable London 2012* produced an informative report in November 2010. This body 'provides assurance to the Olympic Board and the public on how the bodies delivering the London 2012 Olympic and Paralympic Games and legacy are meeting their sustainability commitments'. The report's several recommendations include one seeking clarity and assurance on the process and resources for post-Games restoration of sites.

The Olympics project is of course a massive and complex undertaking. Some planners of yesteryear might have considered biodiversity getting in the way of site development for a built urban environment. The incorporation of proper biodiversity and sustainability planning on this scale can only be applauded even if some would say that it is, nowadays, both necessary and expected. The planning and development period as far as the birds, bees and toads are concerned is inevitably too short, just under four years from the launching in September 2008 of the detailed designs for the parklands etc. to the opening of the Games in 2012. Biodiversity has its own timing and rhythm, but the Olympic Games project offers a natural laboratory with some potentially important lessons for future urban development. Inevitably it remains to be seen as to whether we have enough of the right information to have made the best decisions.

Concluding remarks

In 1953 the Corporation of London published a booklet *The Natural History of the City* (Fitter and Lousley 1953). The Second World War had led to over a quarter of the built-up areas of the City's square mile being laid to waste, particularly during the incendiary raids of December 1940 and May 1941. The bomb sites provided new habitats for species, which were being introduced by wind, horse traffic, importing of goods, etc. Surveys showed the presence of nearly three hundred wild flowers, grasses and ferns, over thirty species of birds and over fifty of insects, many of which had appeared since the start of the war in 1939. Plants grew in the naves of churches which had lost their roofs, coltsfoot and bracken developed on building rubble, and rosebay and Oxford ragwort were in profusion. The populations of the new arrivals would no doubt have been greater had the local atmosphere not been so sooty and smoky. City regeneration then changed it again.

The war situation exemplifies how habitat determines the species, at least in a sustainable sense. As we have illustrated in the three cases, habitat is affected by numerous factors but, in an urban environment, especially impacted by mankind. The dynamic can be a fast changing one, leading sometimes to rapid loss or unexpected gain. Fortunately, London has a long history of interest and activity in green spaces and biodiversity; a history that is still being pursued and one that has a good chance of further improving the quality of life of its residents.

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Selected web sites

(As of April 2012)

London Biodiversity and Action Planning

UK Biodiversity Action Plan
http://jncc.defra.gov.uk/default.aspx?page=5155

London Biodiversity Partnership and the London BAP
http://www.lbp.org.uk/londonap.html

London – Mayor's biodiversity strategy
http://legacy.london.gov.uk/mayor/strategies/biodiversity/docs/strat_full.pdf

London Wildlife Trust
http://www.wildlondon.org.uk/

London Wildlife Trust – Camley Street Natural Park
http://www.wildlondon.org.uk/Pages/Category.aspx?IDCategory=4fd545f7-a11e-4b85-b143-724a886ffa16

London Parks and Gardens Trust
http://www.londongardenstrust.org/

Biodiversity Action Reporting System (BARS). Site under revision
http://www.ukbap-reporting.org.uk/

Environment Agency – State of the Environment – London report
http://www.environment-agency.gov.uk/research/library/publications/34083.aspx

The River Thames — its natural history

http://thames-landscape-strategy.org.uk/biodiversity

London Rivers Action Plan
http://www.therrc.co.uk/lrap.php

The Wildfowl & Wetlands Trust — London site

http://www.wwt.org.uk/visit-us/london

The Olympic site and sustainability

Olympic Park Biodiversity Action Plan (October 2008). By the Olympic Delivery Authority.
http://www.london2012.com/documents/oda-publications/olympic-park-biodiversity-action-plan.pdf

Sustainable Development Strategy
http://www.strategicforum.org.uk/pdf/ODASDSfullpolicy.pdf

Sustainability Plan (2nd edition, December 2009). *Towards a one planet 2012.* 103 pp
http://www.london2012.com/mm/Document/Publications/Sustainability/01/24/07/91/london-2012-sustainability-plan.pdf

Commission for a Sustainable London 2012
http://www.cslondon.org/

Example of a report on survey work and species movement
http://www.wildlifeextra.com/go/news/olympic-wildlife.html#cr

Lichens invade the City of London

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'God made the country, and man made the town' (William Cowper 1785)

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Abstract

The City of London is a supreme example of the built environment, high-rise, where almost nothing is natural. Before 1970 *Lecanora dispersa* was the only lichen which grew there, yet by today forty-two species have been recorded. However, lichens are still scarce, being confined to isolated sites. This was not a case of them returning to former habitats as has happened elsewhere, but is an invasion of an unprecedented nature. The most common species is *Phaeophyscia orbicularis*, but *Caloplaca citrina*, *Lecanora dispersa*, *L. saxicola*, and *Xanthoria parietina* are also present in many places. The most remarkable record is that of the recently described *Bacidia neosquamulosa*. It is the abrupt diminution of sulphur dioxide air pollution which has facilitated this remarkable increase, and it is nitrogen dioxide from vehicles which is now the main pollutant. Calcareous stone is the richest substrate, with 55 per cent of the lichens, but today bark and wood are also favoured habitats in comparison with London in the past. All substrates are affected by eutrophication, associated with a raised pH, aided by the influence of excreta from the feral pigeon, and therefore nitrophilous species in the *Xanthorion* predominate. The lichen vegetation is best developed along the River Thames where *Verrucaria ochrostoma* is now frequent. The most common tree is London plane, but climax communities do not develop on it because it sheds its bark. The cleaning of the remaining sections of the historic London Wall should cease so that lichen colonization can take place.

Introduction

The City of London is unique. It occupies a small area forming a semicircle, about three kilometres across, in the heart of the capital (Figure 1). The magnificent Baroque-domed St Paul's Cathedral, built 1675–1711 by Sir Christopher Wren, and a hotchpotch of tall office buildings, especially Tower 42 in Old Broad Street, by Richard Seifer, 1970–1981, reaching 183 metres (600 ft), dominate the townscape. Taller buildings, notably The Pinnacle in Bishopsgate and Rogers' Leadenhall Building, are now under construction. Together with the glass towers at Canary Wharf to the east in the London Borough of Tower Hamlets, the City became the financial centre of the world following deregulation on 27 October 1986 (the 'Big Bang'), although it had long been devoted to money and power. The economy of Britain relies on its financial services, and it is the City which sustains these. It is everywhere smart and prosperous, with no sign of poverty, vandalism, or graffiti. There is no semi-natural vegetation and no parkland. Thus it is a supreme example of the built environment, essentially high-rise, where almost nothing is natural (Figure 2). Its wildlife is minimal and little studied.

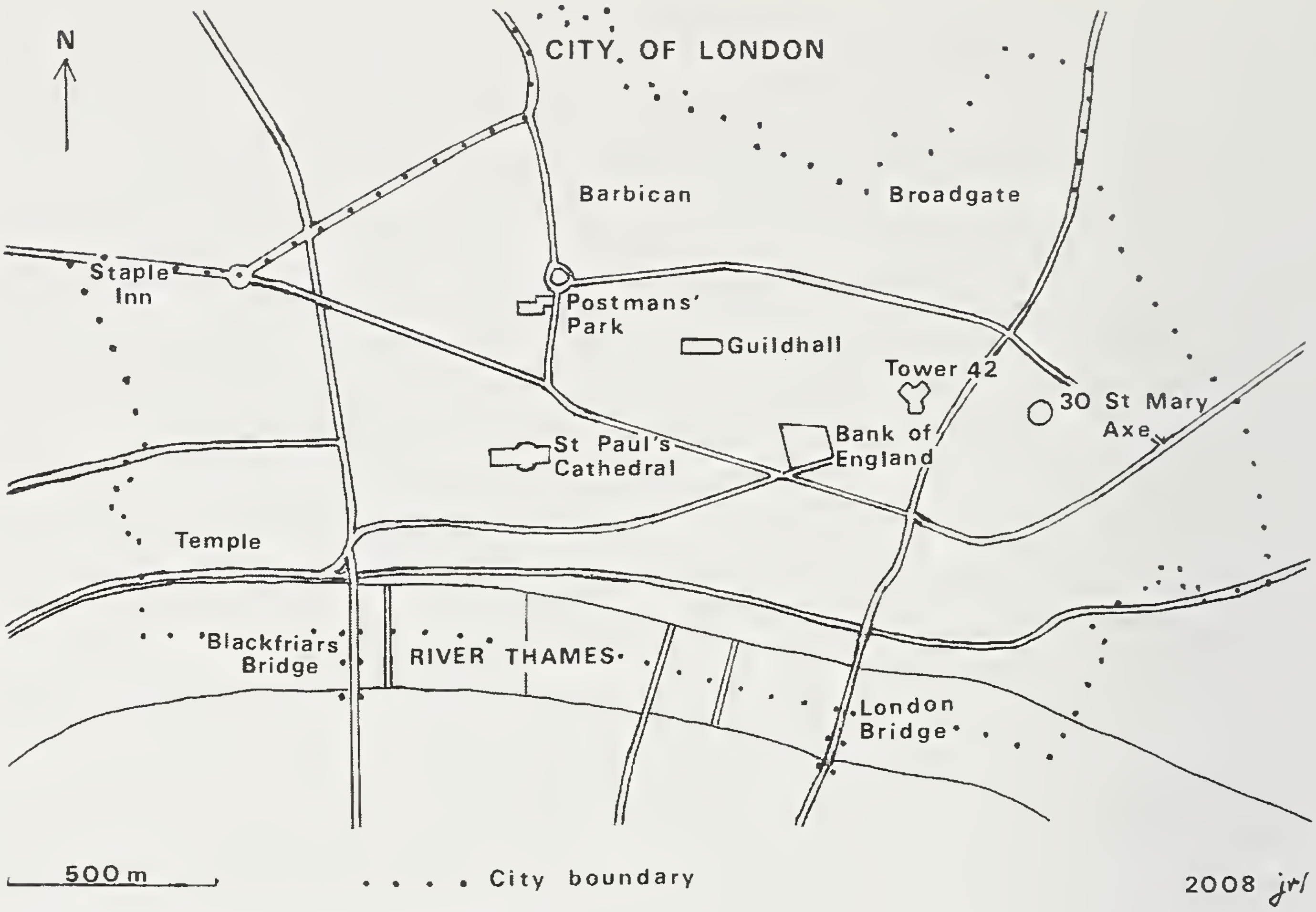

FIGURE 1. Map of the City of London.

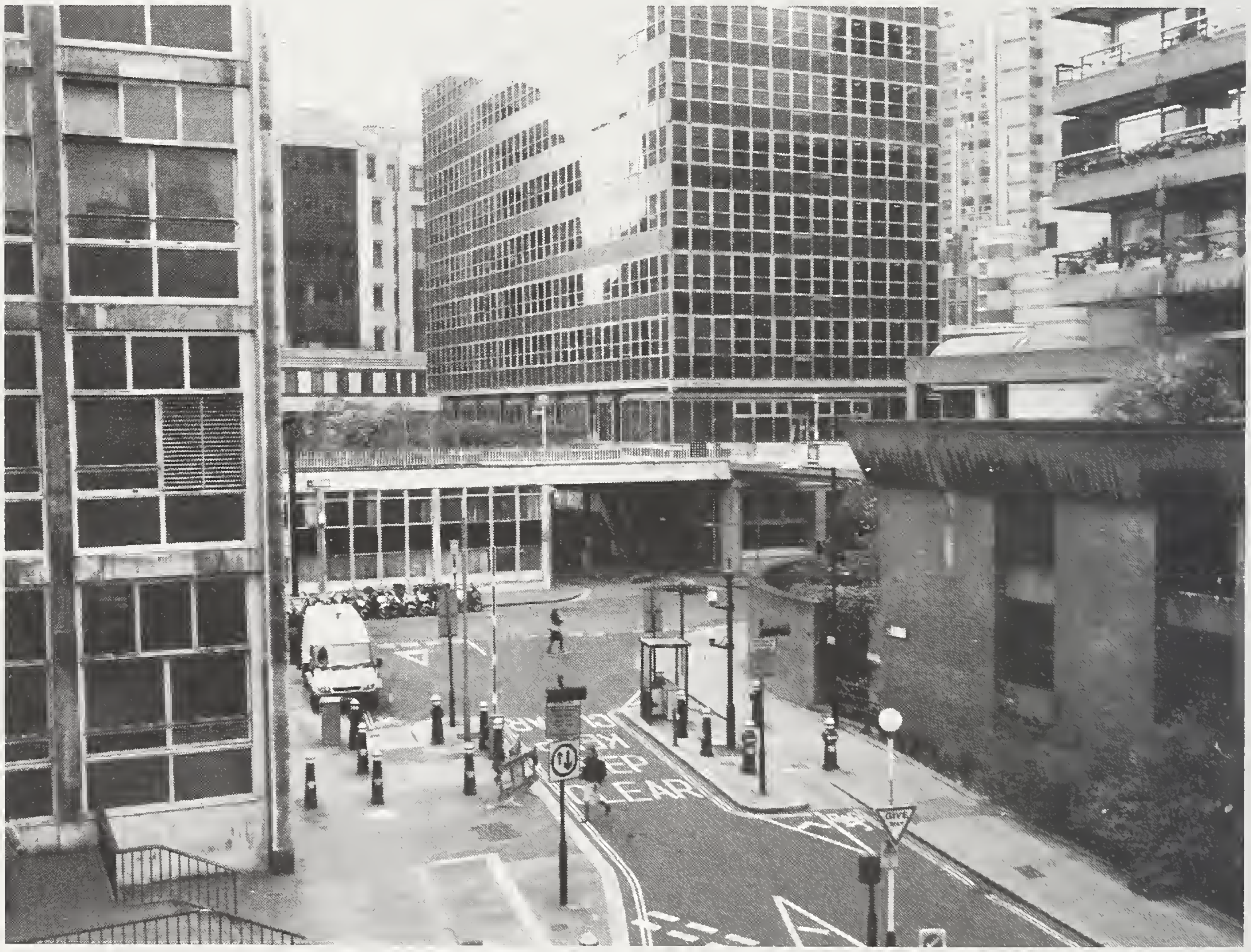

FIGURE 2. City: high-rise, devoid of wildlife. Moor Lane from Moorfields Highwalk, with The Barbican on the right. *Photo: Jack R. Laundon, 2007*

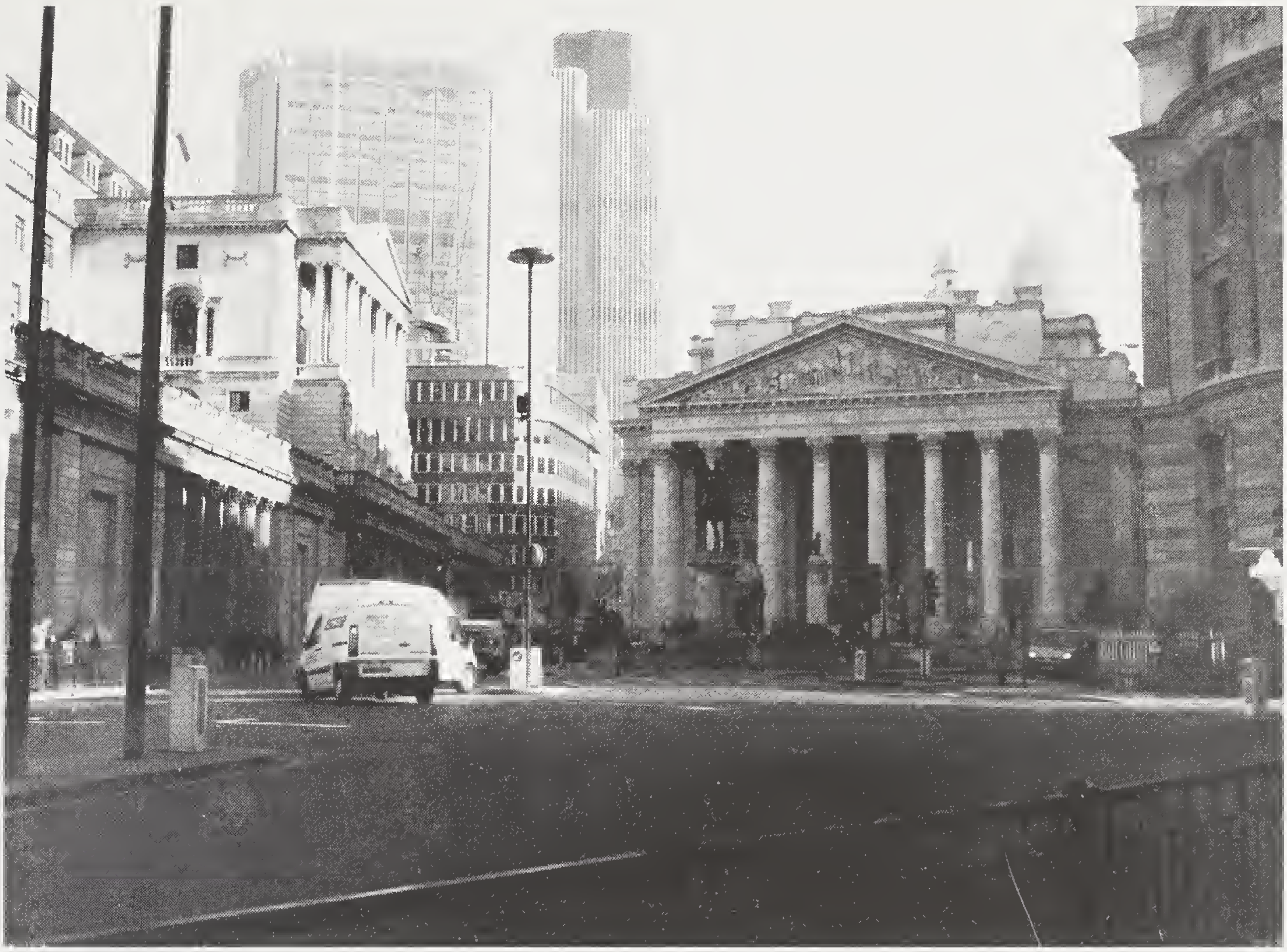

FIGURE 3. City: the Royal Exchange, with the Bank of England on the left and Tower 42 and the apex of the Gherkin behind. *Photo: Jack R. Laundon, 2008*

On the south side is England's most important river, the Thames, which is wide, tidal, and brackish. The City extends to the south side of the river only at Blackfriars and London Bridges (Figure 1). To the west are the quiet lawyers' chambers of the Temple, pleasant buildings mainly dating from 1667 and grouped around courtyards, in contrast to the congested remainder of the City. The north-east corner is occupied by Broadgate, devoted to retail and transport. To the north is The Barbican, a residential and cultural estate built 1963–1981 by Chamberlin, Powell, and Bon. The actual City population is small, fewer than 10,000, but 340,000 commuters arrive each weekday to work in banks, institutions, and offices, as well as in shops and coffee bars. The Square Mile has at present two modern iconic structures: Lloyd's Building in Lime Street built 1978–1986, a leading example of hi-tech, famed for its innovative external service features, by Lord Rogers of Riverside, which is the world's leading insurance association, and 30 St Mary Axe, known as the Gherkin because of its shape, by Lord Foster of Thames Bank, completed in 2003. An important landmark is the Royal Exchange in Threadneedle Street, with an impressive classical portico of 1841–1844 by Sir William Tite, opposite the dull Bank of England (Figure 3). There are some forty small churches and eight towers remaining, all different, some of which are minor Gothic buildings in the Perpendicular style (e.g. St Olave Hart Street), but many are seventeenth century classical by Sir Christopher Wren (e.g. St Stephen Walbrook). Most had small churchyards, now mostly converted into gardens, occasionally with one or two memorials still in place. The City has its own government, administered by the Corporation of London. Also unique are the City of London Police, dealing especially with fraud and security.

Methods

The fieldwork in the City was mostly carried out between 2004 and 2011, when all sites which were considered to be particularly suitable for lichens were visited. Most streets were examined, but a number were missed. Some lichens were doubtless present before these dates. Lichens continue to increase in the City and therefore there are probably more species now than those listed here.

Pollution

The artificial and isolated nature of the Square Mile has brought with it its own climate. It is warmer, drier, and less windy than almost anywhere else in England. The buildings store heat so that frost is uncommon and snow rare. Until the middle of the twentieth century the air was heavily polluted with smoke, soot, and sulphur dioxide, and smogs were frequent. In 1955 the City was declared a smokeless zone, and the Clean Air Act of 1956 enabled surrounding local authorities to establish Smoke Control Areas which cut air pollution in the City considerably.

Today the 'City of London experiences some of the worst air quality in the UK. This is primarily due to density of development and its geographical location. Road traffic is the main source of pollution, supplemented by commercial and domestic heating. Pollutants generated by traffic consist of hydrocarbons, nitrogen oxides, particulates and carbon monoxide. There are no industrial sources of pollution in the City. Being located in the heart of London, the City is heavily influenced by pollution generated in neighbouring authorities and across London as a whole. The south-east of England is also affected by pollutants, particularly fine particulates, which originate in continental Europe' (City of London 2008: 4).

The pollutant which has the greatest adverse effect on lichens is sulphur dioxide (SO$_2$). No lichens had been recorded in the City before 1954, so that the Square Mile was then a lichen desert. This was because of the high level of sulphur dioxide. Between 1971 and 1980 sulphur dioxide concentrations in the City fell by more than 80 per cent (Figure 4), and since 1980 they have halved again, and continue to decline. *Lecanora dispersa* was apparently the only lichen present before 1973, but since then forty-two species have been found. This unprecedented increase is due to the diminution of sulphur dioxide air pollution.

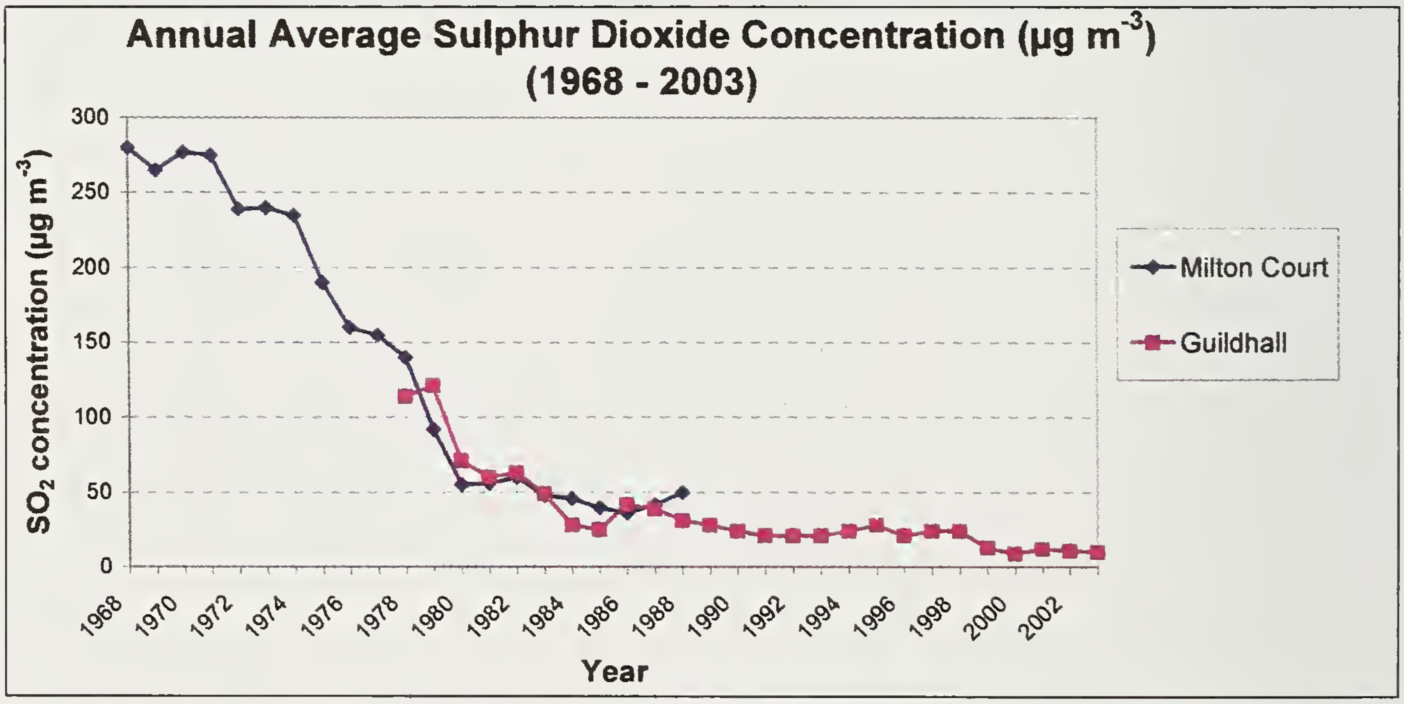

FIGURE 4. City: sulphur dioxide levels from 1968 until 2003. From City of London (2008: 20, Figure 3.4.1).

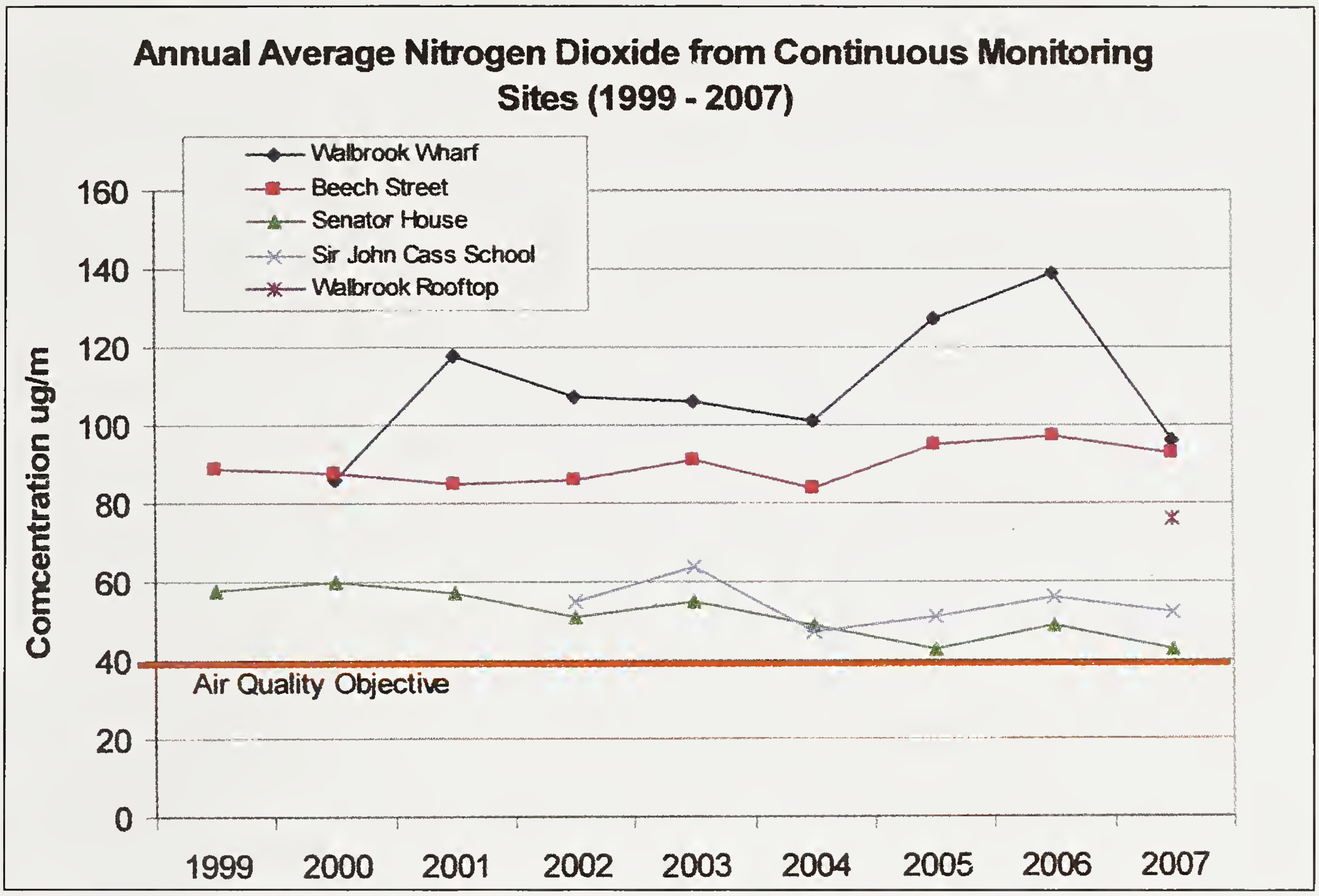

FIGURE 5. City: nitrogen dioxide levels from 1999 until 2007. From City of London (2008: 15, Figure 3.3.1).

Today the most important pollutant is nitrogen dioxide (NO_2). This 'is largely a secondary pollutant formed by the oxidation of nitric oxide (NO). In the City, the primary source of nitric oxide is road vehicles, although the relative contribution from heating and cooling buildings in the City is increasing' (City of London 2008: 13). On average this form of pollution has remained fairly constant in recent years (Figure 5). However, since 2002 nitrogen dioxide levels as measured by diffusion tubes have increased dramatically (City of London 2008: 17). The relationship between the lichen vegetation on trees and oxides of nitrogen was studied and recorded by Davies et al. (2007), and the City epiphytes belong to the lowest ranks 1 and 2 of the scale of sensitivity of lichens to nitrogen dioxide (Davies et al. 2007: 308, Table 2).

A third potentially important pollutant as regards lichens is fine particulate matter (PM_{10}). It is estimated that 85 per cent of particles originate outside the City, 10 per cent from road traffic, especially from diesel vehicles, within the City, and 5 per cent from local construction works, domestic heaters, and industrial boilers. In recent years the concentration of particulates has remained reasonably constant (City of London 2008: 24, Figure 3.6.1). 'Episodes of significant atmospheric pollution in London are often attributed to air masses travelling to the UK from Central Europe' (City of London 2008: 23). Ozone and other city pollutants are considered to have little effect on lichens.

Almost the whole of the City is within the central London Congestion Charging Zone which was introduced on 17 February 2003. This led to a significant reduction in traffic. Moreover, the City is also in the Low Emission Zone which came into force on 4 February 2008, and is expected to reduce pollution from large vehicles. Unfortunately there has been a significant increase in vehicles using diesel, as opposed to petrol, which has exacerbated pollution problems.

Destruction

The City has suffered from waves of destruction which have reduced sites for lichen colonization and for the development of mature communities. It was founded by the Romans as Londinium *c.* AD 47. The present street pattern was established in medieval times. Today every street name is prominently displayed with signs bearing the City of London Arms on the left and the name of the road on the right in distinctive Albertus lettering. Unfortunately most of the medieval buildings were destroyed by the Great Fire in 1666. Only three nationally important buildings survived: Temple Church in Church Court, a splendid building of *c.*1160–1240 in the Early English style, the Guildhall in Guildhall Yard (London's town hall — the guilds controlled all trade), a fine Perpendicular building 1411–*c.*1429 by John Croxton, with a whimsical Rococo Gothic front added by George Dance the younger in 1788–1789, and the magnificent Middle Temple Hall *c.*1570. The only important medieval timber buildings remaining are a group called Staple Inn in Holborn, where the eastern jettied half-timbered walls were constructed in 1586 (Bradley and Pevsner 2002: 341).

Many of the buildings constructed after the Great Fire were destroyed or damaged by German bombing during the Blitz from September 1940–May 1941. The area around St Giles Cripplegate was flattened, leaving a vast expanse of ruined basements open to the sky. These became known as the City bomb-sites, which were eventually built over to become The Barbican. The only bomb-site which now remains is at Christ Church in Newgate Street, where the ruined outer walls of the church survive with openings formerly occupied by windows.

From 1992 the City became a major target for terrorists. The Provisional IRA, a militant organization of Irish Catholics, blew up the Baltic Exchange and Commercial Union building in St Mary Axe on 10 April 1992 killing three persons, one day after a British general election. On 24 April 1993 a bomb was detonated by the Provisionals in Bishopsgate, killing one person and doing much damage. As a result on 3 July 1993 the City was sealed off by reducing the number of entrances from more than thirty to eight, and establishing checkpoints with cameras so that all vehicles entering the Square Mile were security vetted in this 'ring of steel'.

Unfortunately the ring of steel did not extend to the Underground. On 7 July 2005 a bomb was detonated in a train on the Circle Line between Liverpool Street Station and Aldgate under the edge of the City. Seven persons were killed. A British suicide bomber, taking an extreme view of Islamic jihad, was responsible. Meanwhile, buildings continue to be demolished to make room for new ones, so that much of the recent destruction is in fact authorized by the authorities.

Wildlife

The most notorious animal of the City was the black rat *Rattus rattus*. It was formerly common in the Port of London having arrived from Asia on ships. It carried fleas which spread plague to the human population with devastating results. It peaked in 1348, resulting in the Black Death, and again in 1665, to become the Great Plague of London. Fortunately the black rat is now extinct in the City, having been replaced by the brown rat *Rattus norvegicus* which does not carry the plague bacterium.

Rats have no effect on lichen vegetation, but at least one plant (a tree) and one bird do have an impact. The most common tree is London plane *Platanus*

× *hispanica* Mill. ex Münchh. This was published by Münchhausen (1770), based on Philip Miller's description of the Spanish plane tree (Miller 1756–1759). The bark has a characteristic patchy appearance because it peels off in plates. This makes it a temporary habitat for lichen colonization, stable lichen communities not being formed because of the shedding of its bark, and which do not therefore reach maturity. The tree is absent from most rural areas in England so that its lichen vegetation is not studied for comparison from non-polluted areas. It is sometimes planted in other towns, as at Bridge Street in central Peterborough, for example.

The most common bird in the City is feral pigeon *Columba livia*, although other species, such as black-headed gull *Larus ridibundus* and cormorant *Phalacrocorax carbo*, are frequent along the River Thames. Feral pigeons congregate on all the trees in the City, producing copious droppings which influence the surrounding lichen vegetation by promoting only nitrophilous species and excluding others. The pigeon population is maintained by bird lovers who provide food on a daily basis.

Habitats

The oldest lichen habitat is London Wall. This was originally built by the Romans *c.* AD 200, running around the whole of the City from Blackfriars in the west to the site of the Tower of London (now in Tower Hamlets) in the east, a distance of about three kilometres. The Roman wall is distinguished by thin layers of flat red bricks resembling tiles amongst the Kentish rag to promote strength and stability. It was originally six metres tall but was doubled in height in medieval times. The most impressive remaining sections are at Tower Hill Garden and at the rear of The Grange City Hotel off the east side of Cooper's Row, where there are four round-headed Norman openings in the twelfth-century upper part. At Noble Street part of the wall is of nineteenth-century brick. London Wall is restored, cleaned, and maintained by English Heritage, and therefore lichen growth is prevented. At Cooper's Row there is abundant green algal growth of *Desmococcus olivaceus*, but no lichens. At the Museum of London the wall has a few scattered lichen thalli of *Caloplaca citrina, Lecanora saxicola, Phaeophyscia orbicularis, Verrucaria nigrescens,* and *Xanthoria parietina*. It is clear that the wall would be recolonized by lichens if the cleaning was halted and it is therefore desirable that the removal of dirt should cease.

There are no real parks in the City but a few gardens open to the public are present. The largest open space of park appearance is Inner Temple Garden. Here the planted plane trees are quite old and on them lichens are either absent or confined to the base of the trunks. There are no lichens at higher levels on the boles or on the branches or on the twigs. Indeed, there is apparently only one tree in the City, to the south of St Paul's churchyard, where lichens have colonized the branches, and these are too high up for identification. *Bacidia neosquamulosa* and *Candelaria concolor* are two of the most interesting lichens recorded from the City, and both were found in gardens developed from old churchyards. The best converted churchyards are currently St Giles Cripplegate in The Barbican, from which ten lichens have been recorded, St Benet Paul's Wharf off Queen Victoria Street (nine species), and St Dunstan in the East in St Dunstan's Hill (nine species). The small size of the gardens limits their numbers, and the fact that they are often overshadowed by high-rise buildings which cut out sunlight, accounts for much of the poverty. Indeed, throughout the City lichens are scarce, being confined to isolated sites.

The City's lichen vegetation is best developed alongside the River Thames where it can be studied from Thames Path, opened in 1996, which runs through the City en route from Gloucestershire to the Thames Barrier. Here there is ample sunlight, and nutrients are blown in off the water. The river wall has been rebuilt in recent years and a sheet of green alga covers the granite wall between low water mark and high water mark, from where lichens are absent. There is no lichen zonation. The limestone coping of the new wall is now being colonized, but walls topped with granite slabs are bare. *Verrucaria ochrostoma* is the most unexpected arrival here, and is already remarkably common in places. Lichens are often abundant on the tops of wooden piles, rails, and fenders in the river. These occur in odd places to support riverside structures, such as Blackfriars Pier. Unfortunately many of these timbers are inaccessible and therefore lichen study is limited. Wooden mooring posts were abundant along the foreshore in the nineteenth century, but now only one remains: at the bottom of Cousin Lane. At low tide rows of the stumps of upright timbers are exposed; these are the remains of ancient barge beds, installed in the nineteenth century to level and stabilize the foreshore.

Lichens are absent from the walls of most buildings. Vertical walls in the City are poorly lit because the buildings are tall so only shade tolerant species might be expected. However, it is the expensive cleaning of buildings, which was started in earnest in England with St Paul's Cathedral in 1962, chiefly to remove soot, but which has removed lichens as well. Before 1962 many buildings were black with soot which gave them a dramatic quality which is absent today. Now all buildings are kept pristine and lichens are not encouraged.

A future lichen habitat in the City might be green roofs. These are planned for several tall buildings to encourage the return of the black redstart *Phoenicurus ochruros* and other wildlife. Green roofs are different from roof gardens. They are to be strewn with rubble or large pebbles and would therefore have a shallow soil and be colonized by xerophytes and weeds. They would resemble Dungeness beach rather than tidy suburban gardens. The roofs of City buildings can be viewed from the Golden Gallery at the top of the dome of St Paul's Cathedral where it can be seen that several are already covered with large pebbles. As there will be no public access because of health and safety legislation and terrorist concerns, investigations here present difficulties.

Calcareous stone is the richest substrate for lichens with 55 per cent of the City species (Table 1). Worked wood, acid stone, and bark all have similar favourable totals, accounting for 36–43 per cent. Seven per cent of City lichens have even been recorded from metal, but none at all from soil. These percentages make a remarkable comparison with those reported for London as a whole for the period 1956–1970 (Laundon 1970: Table 2) when pollution was at its height. Then calcareous stone was still the richest substrate with 68 per cent of the seventy-one species, whilst acid stone had 30 per cent, but bark had only 13 per cent and wood 11 per cent. The changes in the percentages demonstrate that bark and worked wood now have a richer lichen vegetation in urban areas because of the decline in sulphur dioxide air pollution. The lichens on bark were often transient, for example in the churchyard at St Olave Hart Street, a few thalli of *Caloplaca citrina*, *Lecanora dispersa*, and *Physcia tenella*

TABLE 1. Lichen sites and substrates in the City of London. No species have been recorded from soil. At the end are the totals on a particular substrate expressed as a percentage of the total number of species recorded.

	Sites	Bark	Wood	Calcareous stone	Acid stone	Metal
Bacidia neosquamulosa	1	+	—	—	—	—
Buellia punctata	4	+	+	—	—	—
Caloplaca citrina	21	+	+	+	+	—
C. crenulatella	2	—	—	+	—	—
C. decipiens	5	—	—	+	—	—
C. flavocitrina	1	—	—	+	—	—
C. holocarpa	2	—	+	+	—	—
C. saxicola	2	—	+	+	—	—
C. teicholyta	1	—	—	+	—	—
Candelaria concolor	1	+	—	—	—	—
Candelariella aurella	17	—	+	+	+	—
C. reflexa	1	—	+	—	—	—
C. vitellina	7	—	+	+	+	—
Clauzadea monticola	1	—	—	+	—	—
Diplotomma canescens	1	—	+	—	—	—
Lecania cyrtella	1	+	—	—	—	—
L. erysibe	6	—	—	+	+	—
Lecanora albescens	1	—	—	+	—	—
L. chlarotera	2	+	—	—	—	—
L. dispersa	31	+	+	+	+	—
L. hagenii	1	—	+	—	—	—
L. saxicola	31	—	+	+	+	+
L. stenotropa	1	—	—	—	+	—
Lecidella elaeochroma	2	+	+	—	—	—
L. stigmatea	3	—	—	+	—	—
Micarea prasina	2	+	+	—	—	—
Phaeophyscia orbicularis	33	+	+	+	+	+
Physcia adscendens	1	+	—	—	—	—
P. caesia	1	—	+	—	—	—
P. tenella	12	+	+	—	+	—
Physconia grisea	1	+	—	—	—	—
Protoblastenia rupestris	3	—	—	+	—	—
Rinodina oleae	11	+	+	+	+	—
Scoliciosporum chlorococcum	1	+	—	—	—	—
S. umbrinum	1	—	—	—	+	—
Stereocaulon vesuvianum	1	—	—	—	+	—
Trapelia coarctata	3	—	—	—	+	—
Verrucaria macrostoma	1	—	—	+	—	—
V. nigrescens	16	—	—	+	—	—
V. ochrostoma	2	—	—	+	—	—
Xanthoria calcicola	1	—	—	+	+	—
X. parietina	24	+	+	+	+	+
Total:	**42**	**16**	**18**	**23**	**15**	**3**
Percentage:		**38**	**43**	**55**	**36**	**7**

grew on an old stump in 2008, yet all lichens were absent in 2009 despite the stump itself showing no alteration. There appears to have been a recent decline in corticolous lichens elsewhere in the City.

Invaders

Before 1970 the only lichen recorded for the City was *Lecanora dispersa* (Laundon 1970: 55), which was first found in 1954. Since the early nineteenth century air pollution by sulphur dioxide had curtailed lichen development. Between 1970 and 2011 forty-two species had been reported (Table 1), a remarkable increase. This was not a case of lichens moving back into an area previously occupied, but was a completely new invasion of an unprecedented nature. The lichen vegetation had been increasing in the surrounding parts of London since *c.* 1975, as first reported by Rose and Hawksworth (1981), so a rise in numbers was only to be expected. However, there are probably fewer lichens in the City than in any of the surrounding boroughs, and only Canary Wharf appears to have a more impoverished lichen vegetation than anywhere else.

Bacidia neosquamulosa, Caloplaca crenulatella, C. flavocitrina, Candelariella reflexa, Clauzadea monticola, Lecanora stenotropa, Micarea prasina, Stereocaulon vesuvianum, Verrucaria macrostoma and *V. ochrostoma* are reported here for the City, yet were not found in the whole of London within a radius of sixteen kilometres from Charing Cross before 1970 (Laundon 1970). The most remarkable of these is *Bacidia neosquamulosa* growing on bark. The first specimen of this lichen found anywhere in the world was collected by Peter Earland-Bennett in 1989 in Battersea Park in the London Borough of Wandsworth (Aptroot and van Herk 1999: 126); it became widespread in the Netherlands in the 1990s. Where it originally came from is a mystery. It now appears to be extinct in the Square Mile.

Today the most common lichen in the City of London is *Phaeophyscia orbicularis*, which has been recorded from thirty-three sites (Table 1), seventeen of which were on bark. Before 1970 it was found chiefly in the outer suburbs (Laundon 1970: 26, Fig. 2C) on calcareous stone and asbestos cement roofs, not having been found on bark since before 1812 by Edward Forster from the London Borough of Waltham Forest (Laundon 1970: 41, 62). Other common lichens, recorded from more than twenty sites, are *Caloplaca citrina, Lecanora dispersa, L. saxicola,* and *Xanthoria parietina*. Definite thalli of the *Xanthoria* were not recorded at all in my survey of London lichens between 1950 and 1970, but there were two late-nineteenth-century records (Laundon 1970: 67). Interesting recent colonizers are *Candelaria concolor, Lecania cyrtella,* and *Physcia tenella*. All three were absent from my 1950–1970 survey, but *Candelaria* and *Lecania cyrtella* grew in Walthamstow probably between 1784 and 1796 (Laundon 1967: 306, 311, 315); *Candelaria* was reported again from Chelsea Physic Garden in 1988 (Hawksworth and McManus 1988: 24). *Physcia tenella* now grows in twelve sites in the City (Table 1), but was last reported from London in 1806 from Blackheath (Laundon 1970: 63); the related *P. adscendens* was last found on bark before 1812 in Walthamstow, although it grew later on stone elsewhere in the capital (Laundon 1970: 61). In the City five species, namely *Bacidia neosquamulosa, Clauzadea monticola, Lecanora stenotropa, Scoliciosporum umbrinum,* and *Stereocaulon vesuvianum* have not been found since 2000 and may therefore be extinct.

In the Square Mile all substrates are affected by eutrophication, which arises especially from various human activities, the influence of bird excreta, and the habit of dogs urinating on wall and tree bases. The decline in sulphur dioxide air pollution has enabled nitrophilous lichens to colonize City trees for the first time. Most nitrophobous lichens, such as *Parmelia sulcata* which is now common and widespread on trees in suburban London, are absent. The absence of saxicolous lichens from bark indicates that concrete dust is not a factor directly affecting the lichen vegetation. However, surfaces do have a high pH (Larsen et al. 2007) which is associated with the nutrient enrichment of the environment. Indeed, rising bark pH is considered to be the most important factor affecting the decline of certain acidiphilous species (Massara et al. 2009). The *Xanthorion* has arrived.

In the British Isles most groups of organisms are in decline in the early twenty-first century. Fortunately this is not true of lichens, because in many areas these are increasing, especially those which grow on bark. It is good to be able to report that lichens 'buck the trend' in comparison with other forms of wildlife.

Species

All records are by the author unless stated otherwise. They are listed in full for species recorded for less than ten sites. The singular 'garden' is used for areas formed as one unit; the plural 'gardens' is appropriate only where two or more areas have been united. The nomenclature follows Smith et al. (2009) but with a few corrections which are explained; all the names were critically studied from original references.

***Bacidia neosquamulosa* Aptroot & Herk**

Rare. On bark. Apparently extinct.

Postmans' Park: extensive coating on trunks of two old *Platanus* trees, 5 July 1997, *Laundon* 3294 (**BM**). Later specimens (*Laundon* 3296) collected on 21 March 1998 are paratypes (Aptroot and van Herk 1999: 126). My next visit to the park was in 2004 when all epiphytes were found to be absent.

***Buellia punctata* (Hoffm.) A.Massal. (*Amandinea punctata* (Hoffm.) Coppins & Scheid.)**

Scarce. On bark and worked wood. Nitrophilous.

Barbican: St Giles Cripplegate, a few thalli on *Populus balsamifera*, 1998. Middlesex Street: Petticoat Square Garden, occasional on benches, 2007. Temple: Middle Temple Garden, a few apothecia at base of old *Platanus*, 2007. Thames Path: Waterman's Walk, a few thalli on seats, 2007.

Taxonomy. This species appears under *Amandinea* in Smith et al. (2009: 143). However, Bungartz et al. (2004: 558–560) discussed the delimitation of *Amandinea* in great detail and concluded that it should be included 'within the genus *Buellia*'.

***Caloplaca citrina* (Hoffm.) Th.Fr.**

Local. On brick, cement, and limestone. Nitrophilous. Recorded from 21 sites.

First record. Paternoster Square: abundant on limestone tops of garden containers, 1997.

***Caloplaca crenulatella* (Nyl.) H.Olivier**

Scarce. On calcareous stone. Nitrophilous.

Aldermanbury Garden: one thallus on limestone coping, 2009 & 2010. Cleary Garden, a few thalli on concrete slabs, 2010.

Taxonomy. Navarro-Rosinés and Hladun (1996: 145–148) provided an important detailed account with an illustration of the spores, which are ellipsoid and are not pointed (as wrongly given in Smith et al. 2009: 250, 251, 260). An overlooked lichen distinguished by its smooth weakly areolate thallus, yellow but sometimes discoloured, with numerous small pale orange-yellow flat apothecia; spores ellipsoid 12–20 × 5–8 μm with a narrow septum 1–3 μm wide. It grows especially on calcareous paving slabs.

***Caloplaca decipiens* (Arnold) Blomb. & Forssell**

Scarce. On calcareous walls near the river. Nitrophilous.

St Andrew-by-the-Wardrobe: several thalli on calcareous parapet in churchyard, 2008. Temple: Middle Temple Garden, two thalli on limestone wall, 2007. Thames Path: Dark House Walk, abundant on limestone river wall, 2011; Old Billingsgate Walk, several thalli on limestone river wall, 2010. Victoria Embankment: many thalli on limestone wall on north side, 2006.

***Caloplaca flavocitrina* (Nyl.) H.Olivier**

Rare. On calcareous stone. Nitrophilous.

Tower Hill Garden: several thalli on concrete square on lawn, 2011.

***Caloplaca holocarpa* (Hoffm.) A.E.Wade**

Scarce. On limestone and worked wood. Nitrophilous.

Barbican: John Trundle Highwalk: one thallus on wooden seat, 2007. Temple: Middle Temple Garden: a few thalli on limestone coping, 2007.

***Caloplaca saxicola* (Hoffm.) Nordin**

Rare. On limestone and worked wood. Nitrophilous.

Temple: Middle Temple Garden: one thallus on limestone coping, 2007. Thames Path: Paul's Walk, three thalli on wooden rail of steps above high water, 2010.

***Caloplaca teicholyta* (Ach.) J.Steiner**

Rare. On limestone by the river. Nitrophilous.

Thames Path: Old Billingsgate Walk, one thallus on top of limestone river wall, 2010.

***Candelaria concolor* (Dicks.) Stein**

Yellow candles (Gilbert and Henderson 2001: 34)

Rare. On bark. Nitrophilous.

Whittington Garden: one thallus at base of cf. *Robina*, 22 June 2006, *Laundon* 3327 (**BM**).

***Candelariella aurella* (Hoffm.) Zahlbr.**

Local. On stone, chiefly calcareous, and scarce on worked wood. Nitrophilous.

Recorded from 17 sites.

First record. Press Association Building: 85 Fleet Street, several apothecia on asbestos cement roof, 1973, *A. O. Lloyd*.

***Candelariella reflexa* (Nyl.) Lettau**

Scarce. On worked wood. Confined to the riverside. Nitrophilous.

Thames Path: Paul's Walk, abundant on wooden rails of steps above high water, 2010.

***Candelariella vitellina* (Hoffm.) Müll.Arg.**

Scarce. On walls and worked wood near the river. Nitrophilous.

Blackfriars Bridge: occasional on stone on recesses, 2007. St Benet Paul's Wharf: several thalli on top of shaded brick wall, 2007. Thames Path: Old Billingsgate Walk, several thalli on limestone river wall and on wooden seats, 2010; Queenhithe Wharf, abundant on top of wooden fenders, 2007–2010; Sugar Quay Walk, several thalli on top of brick river wall, 1998–2010; Waterman's Walk, several thalli on wooden seats, 2007. Tower Hill Garden: several thalli on fence rail, 2011.

***Clauzadea monticola* (Ach.) Hafellner & Bellem.**

Rare. On concrete.

Barbican: Brandon Mews, frequent on concrete coping, 1998.

***Diplotomma canescens* (Dicks.) Flot. (*Diploicia canescens* (Dicks.) A. Massal.)**

Rare. On worked wood. Confined to the riverside. Nitrophilous.

Thames Path: Paul's Walk, one thallus on wooden rail of steps above high water, 2010.

Taxonomy. Molecular research (Molina et al. 2002) has shown that *Diploicia* and *Diplotomma* are synonymous, and the former genus cannot be retained.

***Lecania cyrtella* (Ach.) Th. Fr.**

Rare. On bark. Nitrophilous.

West Smithfield: scarce on old *Platanus*, 2011, *Laundon* 3343 (**BM**).

***Lecania erysibe* (Ach.) Mudd**

Scarce. On calcareous stone and brick. Nitrophilous.

f. *erysibe* has abundant apothecia with no soredia.

Barbican: St Giles Cripplegate, a few thalli on limestone bodystones, 1998. Portsoken Street Garden: a few thalli on brick, 2005. St Benet Paul's Wharf: abundant on limestone stacked copings, 2007. St Dunstan in the East churchyard: on brick, 2005. Tower Hill Garden: one thallus on concrete, 2011

f. *sorediata* J.R.Laundon (1967: 315) is sorediate and sterile in the City.

St Benet Paul's Wharf: numerous thalli on stacked copings, 2007. Temple: Middle Temple Garden, occasional on limestone wall, 2007.

Nomenclature. The erroneous name '*soralifera*' was given for this form in Smith et al. (2009: 459).

***Lecanora albescens* (Hoffm.) Branth & Rostr.**

Rare. On limestone. Nitrophilous.

Temple: Middle Temple Garden, several thalli on limestone parapet, 2004–2007.

Nomenclature. The authorship of this name was discussed by Laundon (2010: 631).

***Lecanora chlarotera* Nyl.**

Rare. On bark. Nitrophobous.

Friday Street and off St Andrews Hill: on *Fraxinus*, 2002–2003, *L. Davies*.

***Lecanora dispersa* (Pers.) Sommerf.**

Local. In small quantities on bark, brick, cement, limestone, and worked wood. Nitrophilous. Recorded from 31 sites.

First record. Jewin Street: April 1954, *Laundon* 841 (**BM**).

***Lecanora hagenii* (Ach.) Ach. nom. cons.**

Rare. On worked wood. Confined to the riverside. Nitrophilous.

Thames Path: Paul's Walk, a few apothecia on wooden rail of steps above high water, 2010.

Nomenclature. Laundon (2003: 98) showed that *Lichen hageni* Ach. is the valid name for *Lichen coerulescens* K.G. Hagen, but Śliwa and Hawksworth (2006) then proposed that the former name be conserved with a new conserved type; this was adopted (Norvell 2008: 639).

***Lecanora saxicola* (Pollich) Ach. (*L. muralis* Rabenh.)**

Pavement rosette (Laundon 2010: 634).

Local. On concrete tiles, limestone ledgers, metal, paving, walls, and worked wood. Recorded from 31 sites.

First record. Press Association Building: 85 Fleet Street, small thalli on asbestos cement roof, 1973, *A. O. Lloyd*.

Nomenclature. Laundon (2010: 634) gave an account of the names of this lichen.

***Lecanora stenotropa* Nyl.**

Rare. On acid stone. Confined to the riverside.

Thames Path: Sugar Quay Walk, frequent on brick river wall, 1998.

***Lecidella elaeochroma* (Ach.) M. Choisy**

Rare. On bark and worked wood. Nitrophobous.

Apothecary Street: on two roadside *Fraxinus*, 2002–2003, *L. Davies*. Tower Hill Garden, several thalli on fence rail, 2011.

Nomenclature. Galloway (2007: 771) gave Hazlinszky von Hazslin (1884: 197) as the author, but this is wrong because he included the species in *Lecidella enteroleuca*.

***Lecidella stigmatea* (Ach.) Hertel & Leuckert**

Scarce. On cement and limestone.

Aldermanbury Garden: scarce on limestone coping, 2009. All Hallows on the Wall: scarce on limestone coping of brick wall, 2008. St Dunstan in the East churchyard: on cement on low brick wall, 2005.

***Micarea prasina* Fr. typ. cons.**

Scarce. On bark and worked wood.

Barbican: John Trundle Highwalk, occasional on wooden seats, 2007. Moorfields: on roadside *Fraxinus*, 2002–2003, *L. Davies*.

***Phaeophyscia orbicularis* (Neck.) Moberg**

Local. On bark, memorials, and walls; scarce on metal and worked wood. Nitrophilous. The most common lichen throughout the City, recorded from 33 sites.

First record. Barbican: Brandon Mews, frequent on concrete coping, 1998.

***Physcia adscendens* H. Olivier nom. cons.**

Rare. On bark near the river. Nitrophilous.

Temple: Inner Temple Garden, two thalli at base of old *Platanus*, 2007.

Nomenclature. *P. adscendens* is an illegitimate name based on *Lichen hispidus* Schreb. Fortunately the name *Physcia adscendens* has been conserved so that it can still be used (Laundon 1995: 246).

***Physcia caesia* (Hoffm.) Fürnr.**

Rare. On worked wood. Confined to the riverside. Nitrophilous.

Thames Path: Waterman's Walk, one thallus on seat, 2007.

***Physcia tenella* (Scop.) DC. nom. cons.**

Scarce. On bark and worked wood; rare on brick. Nitrophilous. Recorded from 12 sites.

First record. Postmans' Park: two small thalli on old *Platanus* bark, 1998.

Nomenclature. *Lichen tenellus* Scop. is an illegitimate name for *L. hispidus* Schreb., but fortunately it has been conserved (Laundon 1995: 247).

***Physconia grisea* Poelt**

Rare. On bark. Nitrophilous.

West Smithfield: one thallus on old *Platanus*, 2011, *Laundon* 3344 (**BM**).

Nomenclature. *Lichen griseus* Lam., *Encycl. Méth.* **3:** 480 (1791) is the basionym of *Physconia grisea*, but this is a superfluous name for *Lichen pallescens* L., *Sp. Plant.* **2:** 1142 (1753), now *Ochrolechia pallescens* (L.) A.Massal., which Lamarck cited as a synonym. Thus it must be rejected under Article 52.1 of the *International Code of Nomenclature for algae, fungi, and plants* (2012).Therefore the name and authorship of this lichen require further study.

***Protoblastenia rupestris* (Scop.) J. Steiner**

Rare. On limestone.

Barbican: St Giles Cripplegate, on limestone bodystone in churchyard, 2006. Cleary Garden: one thallus on cement of buttress, 2010. Temple: Middle Temple Garden, two thalli on limestone wall, 2007.

***Rinodina oleae* Bagl. (*R. gennarii* Bagl.)**

Local. On bark, stone, and worked wood. Nitrophilous. Recorded from 11 sites.

First record. Paternoster Square: several thalli on limestone tops of garden containers, 1997.

***Scoliciosporum chlorococcum* (Graewe ex Stenh.) Vězda**

Rare. On bark.

Moorfields: on roadside *Fraxinus*, 2002–2003, *L. Davies.*

***Scoliciosporum umbrinum* (Ach.) Arnold**

Rare. On wall.

Thames Path: Sugar Quay Walk, occasional on brick on top of river wall, 1998.

***Stereocaulon vesuvianum* Pers.**

Rare. On wall. Extinct.

Gresham Street/Noble Street corner: several thalli on coping of brick wall, 1984, *P. M. Earland-Bennett.*

***Trapelia coarctata* (Sm.) M. Choisy ex Werner**

Rare. On brick walls.

Gresham Street/Noble Street corner: one thallus on coping of brick wall, 1984, *P. M. Earland-Bennett.* St Alphage Garden, one large thallus on brick churchyard wall, 2006. St Dunstan in the East churchyard: on brick, 2005.

Nomenclature. The authorship of this name in Smith et al. (2009: 907) is wrong; see Laundon (2005: 491) for the correct citation.

***Verrucaria macrostoma* Dufour ex DC.**
Rare. On cement.
Cleary Garden: one thallus on cement of buttress, 2010.

***Verrucaria nigrescens* Pers.**
Local. Chiefly on limestone. Recorded from 16 sites.
First record. Thames Path: Dark House Walk, common on river wall, 1998.

***Verrucaria ochrostoma* (Borrer ex Leight.) Trevis.**
Local. On limestone.
Thames Path: Dark House Walk, frequent on limestone top of river wall, 2011; Old Billingsgate Walk, frequent on limestone top of river wall, 2010 & 2011, *Laundon* 3342 (**BM**)
Taxonomy. Grey and areolate with a granular surface; perithecia immersed; involucrellum absent; spores 21–26 × 11.5–15 μm. Determined by Alan Orange.
Nomenclature. The earlier *Verrucaria ochrostoma* Turner & Borrer ex Schaer., *Lichenum helveticorum spicilegium* **1** (7): 347 (1836) was published as a synonym ['forma mihi videtur'] of *Urceolaria scruposa*, and was therefore not valid under Article 34.1 of the *International Code of Nomenclature for algae, fungi, and plants* (2012).

***Xanthoria calcicola* Oksner**
Rare. On brick walls. Confined to the riverside. Nitrophilous.
Thames Path: Sugar Quay Walk, one thallus, 7 cm diameter, on top of brick river wall, 1998; four large thalli, 4–13 cm diameter, here in 2010.
Nomenclature. The wrong author is given in Smith et al. (2009: 969).

***Xanthoria parietina* (L.) Th. Fr.**
Golden shields (Gilbert and Henderson 2001: 37).
Local. On bark, metal, stone, and worked wood. Nitrophilous. Recorded from 24 sites.
First record. Thames Path: Cousin Lane, about 12 fertile thalli 3–4 cm diameter on wooden piles at high water mark, 1988, *P. M. Earland-Bennett.*

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POSTSCRIPT

In 2012 Amanda Waterfield discovered that extensive sheets of lichens were now present on wooden rails on St Alphage Highwalk in The Barbican. I examined these and recorded sixteen species here, probably missing a few crusts. Five were new to the City as follows:

***Flavoparmelia caperata* (L.) Hale**
Six thalli, with diameters ranging from 20 to 70 mm.

***Melanelixia fuliginosa* subsp. *glabratula* (Lamy) J. R. Laundon**
One thallus, 35 mm diameter.

***Parmelia sulcata* Taylor (*P. encryptata* A. Crespo et al.)**
Two thalli, one 35mm diameter and the other 25 mm diameter. One with soredia.

***Punctelia subrudecta* (Nyl.) Krog**
One thallus.

***Xanthoria polycarpa* (Hoffm.) Th. Fr. ex Rieber**
Occasional. A number of thalli were present.

Bats and lighting — six years on

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Abstract

Since my 'Bats and lighting' review (Fure 2006), there has been interesting comment from a number of sources: bat workers, entomologists and those from ophthalmic fields; lighting professionals from the UK and Europe; and natural light campaigners (CPRE and the Campaign for Dark Skies, CfDS). There has also been an increase in studies, reviews, publications and guidance. Topics range from bat ecology, bat physiology, bats v. illumination and insects v. illumination, and as prey species, rendering the initial review out of date. All beg for a swift and positive intervention to change the way that we light the environment.

Introduction

Recent increases in the levels of illumination have met with detailed responses from many sources including

- The Royal Commission on Environmental Pollution reporting on the negative ecological consequences of illumination for most species (Lawton 2009)
- Research on the effects of illumination on bats: at their roost (Boldogh et al. 2007), along commuting routes (Stone et al. 2009, 2012) and foraging areas (Fure and Wedd 2010), and widely reviewed (Eurobats 2010)
- The publication of the 'Ecological Consequences of Artificial Night Lighting', a summary of the negative influences of illumination on mammals, birds, reptiles, fish, insects and plants (Rich and Longcore 2006)
- Research on the effect of increasing urbanization and the 'tipping point' for pipistrelle bats (Hale et al. 2012)
- Unpublished research on the monitoring of insect abundance and bat activity whilst manipulating light levels (Evens 2012)
- Comprehensive reviews on insects, which form the prey species of all bats on the British list and the effects of illumination (Eurobats 2010, Bruce-White and Shardlow 2011).

The Buglife review (Bruce-White and Shardlow 2011) was a turning point, highlighting the scale of disruption to many ecological processes, as well as 'termination by lamp', of a complex and beautiful life cycle. In order successfully to mitigate the effects of artificial illumination on bat populations, it is essential to understand the interactions of bats and insects and the effect of lighting. The following focuses on the London region, a champion for light pollution (LP) and is aimed particularly at the fieldworker charged with balancing the sociological and ecological, with regional values and norms, using data gleaned from an armoury of scientific instruments. It gives examples of the most accessible research (post-2006) and attempts to answer the two most often asked questions: why do bats feed around lights and what are the maximum acceptable lux values at important bat commuting and foraging habitat. There is comment on guidance and policy measures to see if they are adequate or whether it is poor enforcement or sheer lack of will that has led to uncontrolled illumination blotting out the night sky in our region. The report ends by sharing measures which have been usefully employed on projects with varying degrees of success. It hopes for an 'Olympic' legacy: to ensure that from this point on, each successive year will not only see a reduction in illumination (especially along our rivers and canals) but a diminution of our tolerance of unnecessary lighting, viewing it as a form of anti-social behaviour.

Many London councils are increasingly acting as commissioning bodies, with a reduced role in service delivery. Councils are extending the opportunity to local interest groups to take over the management of parks and open spaces. It is these groups who are in the front line when protecting their local sites from character-changing planning applications, or the use of protected areas as theme parks or sports stadiums. In my own borough, there is an application to incorporate 218 light units into an area featuring a Daubenton's bat *Myotis daubentonii* maternity colony, one of only four recorded in the region in as many years. This indicates the need for a louder message, achieved by more conduits from scientific papers to grass roots, in order to disseminate information to those in the frontline. Anthropogenic in nature, LP issues cannot be separated from politics, economics and culture.

What follows is largely London-centric. It does not necessarily seek to repeat advice expounded by the Bat Conservation Trust (BCT), the Institute of Lighting Professionals (ILP) or the Campaign for Dark Skies (CfDS), which all offer invaluable guidance. It is worth stating at the outset that the author is in accord with a strapline of the ILP 'Lighting where needed and when necessary'. It is beyond the scope of this report to comment on light dimming or part-night lighting where it has been invoked (Leicestershire, Norfolk etc.). This has been done not as a protection measure for nocturnal wildlife or the night sky, but as a cost-cutting measure, as councils collectively spend £529 million on street lighting, which accounts for 5–10 per cent of each council's carbon emissions.

Studies

A limitation of Fure (2006) arose from a lack of published material examining the physiology of bat retinas. It has been believed that the retina of microchiropteran bats contained predominantly rods, the photoreceptors at the basis of 'scotopic' vision (vision of the eye under low light conditions) and that bats lack cones. Recently it has been demonstrated how at least some species (common pipistrelle bats *Pipistrellus pipistrellus* and greater horseshoe bats *Rhinolophus ferrumequinum*) possess a significant number of cones (Kim et al. 2008, Müller et al. 2009). Nevertheless, the size and shape of eyes, photoreceptor organization, and colour sensitivity differ dramatically depending upon an animal's specific needs and photic environments, and the arrangement of cones has not yet been established in *Myotis* bats. Bat vision has been shown to be best in low ambient lighting, due to the high proportion of rods compared with cones. Having eyes sensitive to low light levels (more sensitive than human eyes) a bat confronted with artificial light may be an annoyance and possibly painful (Limpens et al. 2012).

It is therefore worth restating at the outset that emergence times from roosts appear to act as an indication of the differing light tolerance through the range of species. Those bats which emerge late in the evening, such as *Plecotus* and *Myotis*, particularly the Natterer's bat *Myotis nattereri*, have a reduced tolerance to lighting. But as intensity of light increases, even relatively light-tolerant species are delayed in emergence from their roosts. Larger, high-flying species such as noctule *Nyctalus noctula* are not as affected by illumination. They will often fly during the daytime and feed above installations employing security lights. LP, either direct or indirect (from sky glow) is increasing in London and may eventuate in outstripping the tolerance of *Myotis* species. Daubenton's bats have been declining on London's waterways (Briggs et al. 2007).

Since the 2006 review, researchers have demonstrated the conservation consequences for bats from illuminated roosts, feeding after a delayed emergence (Boldogh et al. 2007). Mothers from illuminated maternity roosts produced juveniles with smaller forearm and body mass measurements than the young from unlit roosts. This is after the peak availability of insects, leading to inferior foraging opportunities for bats.

The effect of illumination on commuting bats has been measured at linear features. These can be energy saving for bats, offering reduced exposure from weather conditions, such as wind and rain, and also reduce predation exposure (Stone et al. 2009). The researchers installed high-pressure sodium lights to mimic the intensity and light spectra of street lights along commuting routes of lesser horseshoe bats *Rhinolophus hipposideros*. Bat activity was reduced dramatically and the onset of commuting behaviour was delayed in the presence of lighting (with no evidence of habituation). The results of the study demonstrated that illumination has a significant impact on the selection of flight routes of bats.

Subsequent studies demonstrated little difference in both the magnitude and nature of the impact of LEDs on lesser horseshoe bats *R. hipposideros* and *Myotis* species, causing a significant reduction in activity along lit hedgerows (Stone et al. 2012). Researchers found that even the lowest light levels (3.6 lux) had an effect on behaviour. They stated that lower levels of illumination may not be suitable for human use.

Kuijper et al. (2008) placed a light source along existing commuting routes which clearly disturbed the behaviour of another *Myotis* species, commuting pond bats *Myotis dasycneme*. Foraging behaviour, expressed as the percentage of feeding buzzes, was reduced by 49–84 per cent during the four nights along Workumertrekvaart with experimental light compared to nights without light. The highest proportion of bats turned between fifteen and ten metres distance from the light source at light levels of approximately 0.6–3.2 lux. This indicates that light levels slightly above natural light values (in this example moonlit nights were given as 0.12 lux) along commuting routes may have disturbing effects. If these disturbing effects take place on a large scale, they may have negative effects on the fitness of individual bats, particularly lactating females. The aim should therefore be to keep light away from the feature of interest (as well as reducing sky glow). Perhaps there is no acceptable illuminance level at a feature, especially when we have technology to prevent it.

Bat Groups occasionally undertake surveys on the effect of illuminating water on the foraging behaviour of Daubenton's bats. During studies of water bodies, Daubenton's bats were negatively influenced by the addition of artificial lighting and foraging activity was reduced (Surrey and Lancashire Bat groups; see Fure 2006). This type of study is repeatable on a large scale and the effect of relatively small changes in light levels created by different moon phases is apparent.

Twenty-one surveyors from the London and Hertfordshire & Middlesex Bat Groups along with the London Borough of Redbridge Ranger Service, participated in a Moon Phase Survey at eight sites (Fure and Wedd 2010). Bat counts were made at open areas around water bodies during 'No Moon' on 10 August 2010 and the 'Full Moon' on 24 August 2010. Standing at a spot in an open area, participants counted the number of Daubenton's bat passes obtained, using a torch. When the number of passes was compared, it was found that activity was reduced by almost two thirds (63 per cent) (at sites where data were obtained) during the full moon (Table 1). The results can be used to inform light threshold information as a full moon at its peak can be as low as 0.25 lux in the London region (0.1–0.3 under clear conditions elsewhere; Rich and Longcore 2006). A clear relationship between bat activity and light has been noted during surveys. As light levels increase bat activity decreases or changes. Daubenton's bats were not found *routinely feeding* above 0.1 lux (Fure 2006). *Myotis* species are associated with dark river conditions created by overhanging riparian vegetation in urban areas.

An unpublished study (Evens 2012) considers the vacuum effect of insect attraction to a light source which 'left the light shy *Myotis* species with reduced insect prey at their preferred foraging areas' (the water surface). Evens carried out insect sampling, using a net attached to a handle. Metal stakes positioned

TABLE 1. To show the number of Daubenton's bat passes during different moon phases.

	Number of Daubenton's bat passes during 'No Moon' 10 August 2010	**Number of Daubenton's bat passes during 'Full Moon' 24 August 2010**
Oakmere Lake, Potters Bar 3 stations	83	31
	273	103
	370	187
Pen Ponds, Richmond 3 stations	260	0
	60	0
	160	119
Total	**1,206**	**440**

two metres apart were used as a guide to conduct ten sweeps progressing from ground level to a height of three metres. Insects were divided into five size classes, between 0–1.9 mm and 20+ mm. Insect sampling occurred between the lamp and the riverbank at each study site. The study concludes that even a relatively low level of illumination can have significant impacts not only upon bats but also insect activity and leads to changes in species assemblage, giving a competitive advantage to pipistrelle bats and reduction in foraging success of *Myotis* species.

Recent Dutch studies have attempted to find a wavelength with the least effect on bat behaviour and various colours have been trialled. Green LEDs have been used in Assen, Netherlands, to illuminate cycle paths along natural areas, although effects on bat behaviour can still be observed (Glazenborg et al. 2010) and R. Meijer (pers. comm., July 2012). The search for solutions and a desire to lessen the impact of lighting on the environment means that green-coloured street lighting can be seen illuminating roads at several municipal locations. There are no empirical studies supporting the use of this wavelength for bats but it probably originates from the work on oil rigs and birds (Poot et al. 2008).

The Dutch Mammal Society has demonstrated that bats cannot see amber-coloured lights. In a field experiment on a flight path of pond bats *Myotis dasycneme* following a forest canal in 2010 where no artificial light was present (Limpens et al. 2012), different light treatments were compared: darkness, amber, traditional white street lamps and a green. Five units of floating automatically recording stereo HET detectors were positioned in the canal. The results showed a lower total of bat passes when white and green were used as compared to darkness, and no difference between darkness and amber, suggesting avoidance of white and green. A paper with details of a ‘bat friendly colour spectrum’ will be given by Limpens et al. at the Irish Bat conference in September 2012. Examples of the use of narrowband amber LEDs are found in the section on case studies.

A four-year study led by the Netherlands Institute for Ecology at Wageningen and Wageningen University is looking at the effect of four different coloured-light treatments, which include the spectra used in Philips ClearField and Clearsky lamps (K. Spoelstra 2012, and pers. comm.). The study is taking place in the Veluwe nature reserve, through a forest edge gradient. Four rows of street lighting columns with luminaires containing green, white and red LEDs (along with a control for no light) have been temporarily erected at 150-metre intervals. The columns are placed twenty-five metres apart and monitored by bat-detection equipment positioned on nearby trees (Figures 1 and 2). These will record the species and number of bat passes at each station, while camera traps monitor additional mammal species, whilst bird groups study birds nesting in the vicinity at each light treatment. Moths are collected with Heath traps; changes in plant community and phenology are monitored. It is possible for independent researchers to study the effects of the different lamps on species from their fields of interest by arrangement with the project leader.

The extent and density of urbanized land-use is increasing, with implications for habitat quality, connectivity and city ecology. Little is known about ‘densification’ thresholds for urban ecosystem function and the response of nocturnal mammals is poorly studied (Hale et al. 2012). In this study, common pipistrelle activity exhibited a non-linear relationship with the area of built land cover and was much reduced beyond the threshold of about 60 per

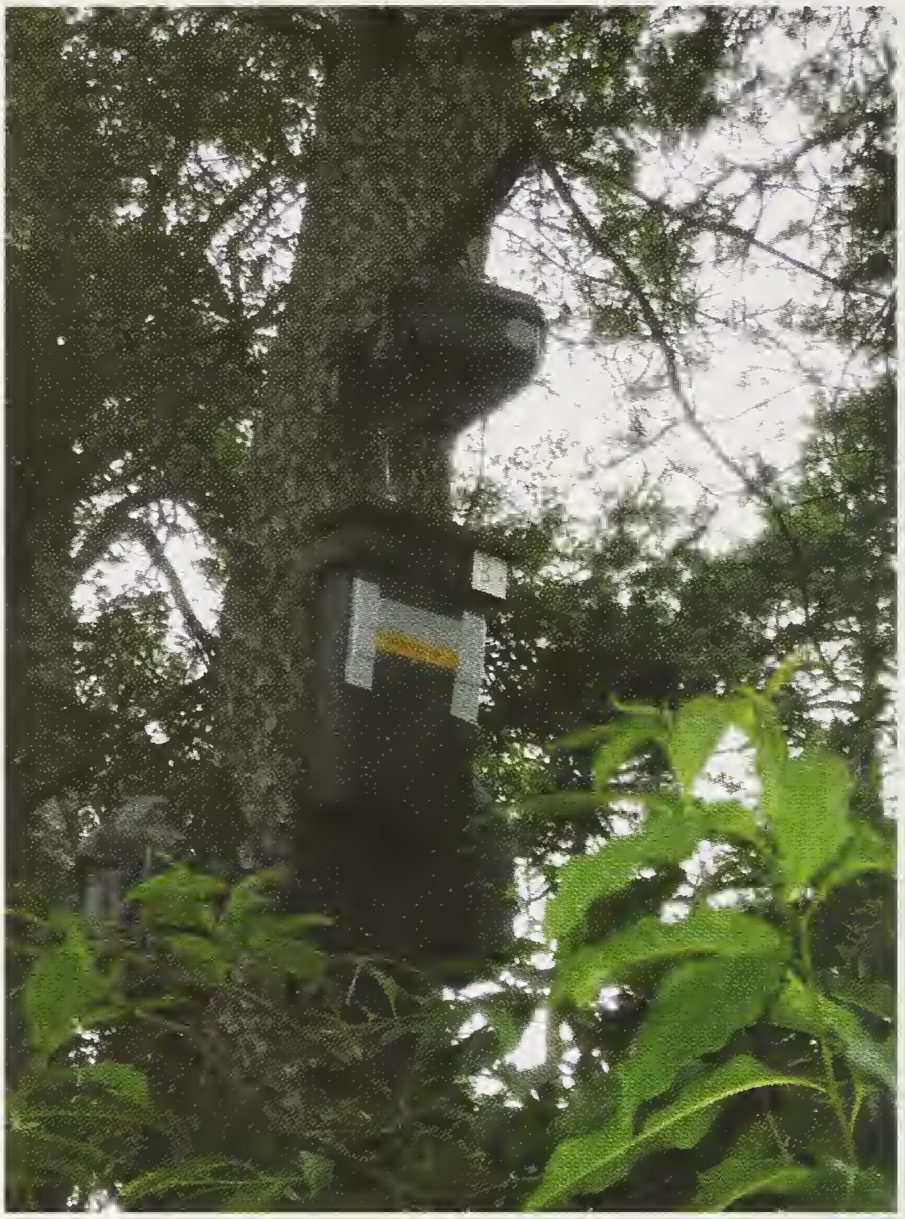

FIGURE 1. A monitoring station. *Photo: A. Fure*

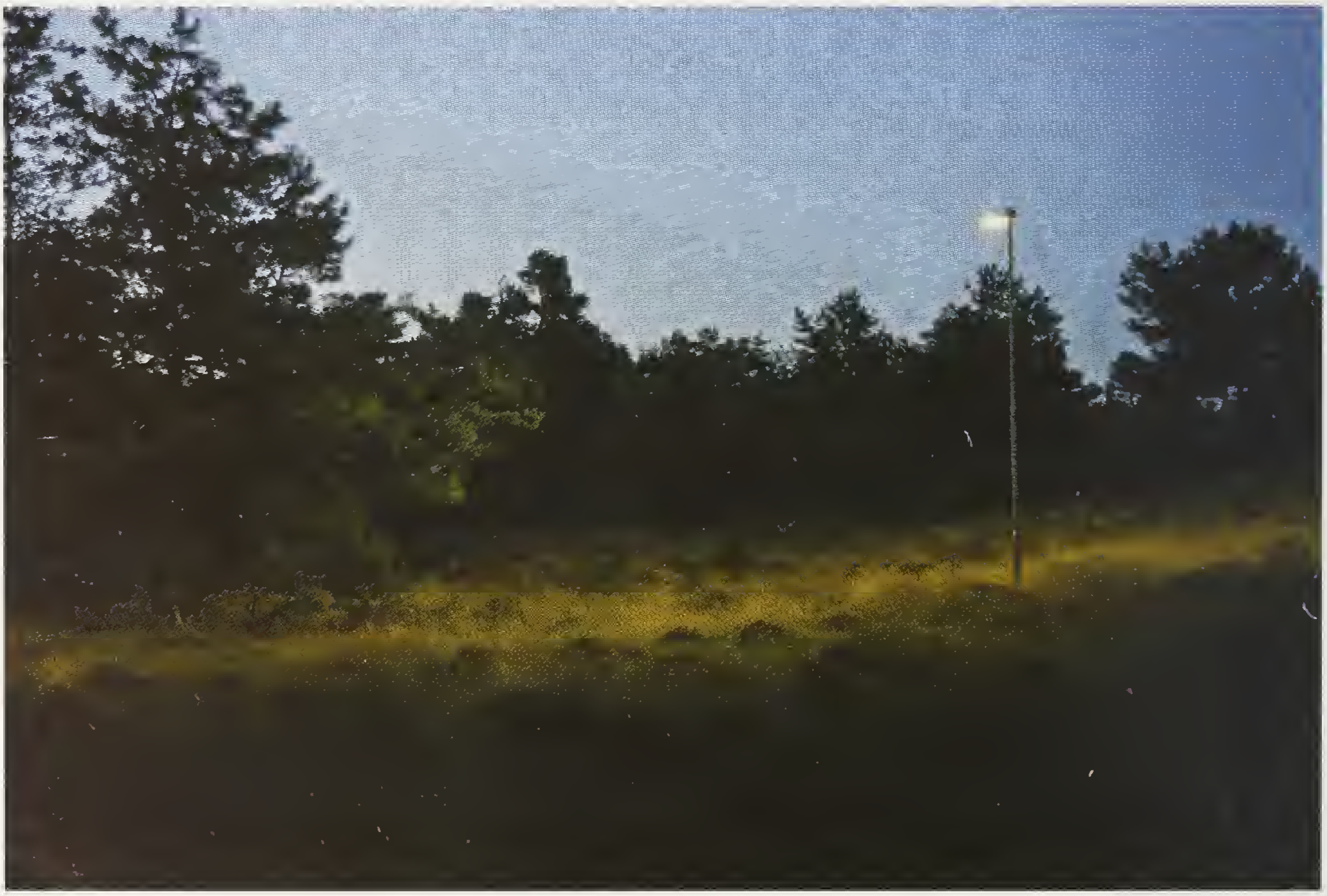

FIGURE 2. Lighting columns, Veluwe. *Photo: K. Spoelstra, July 2012*

cent built surface, implying the existence of a threshold or tipping point. Protecting and establishing tree networks may improve the resilience of some bat populations to urban densification. The researchers argue for further study of the impacts of lighting, roost availability and the abundance of insect prey to explain these results. Their work continues to map nocturnal landscapes from the air and, with the aid of very high-resolution images, analyse lighting installations across the city of Birmingham and elsewhere.

Moth species have declined by 75 per cent in recent years (Bruce-White and Shardlow 2011). As the wavelength of light decreases, the attractiveness to insects increases. As low-pressure sodium light has wavelengths in the region of 555 nm it does not attract insects. High-pressure sodium does attract some insects, but on average 57 per cent fewer insects than mercury-vapour light source (Patriarca and Debernardi 2010). A popular theory for the flight-to-light response is whereby insects mistake light sources as the moon, upon which they rely for nocturnal orientation (Frank 2006). This positive 'phototaxis' can lead to demographic insect losses and a third of the insects that fly around light will damage themselves or die.

The effect of illumination on organisms in the water column could compound the disadvantages of illumination for Daubenton's bats. Light pollution, or the sky glow produced by inefficient outdoor lighting, can affect water quality because zooplankton grazing influences water quality and the depth distribution of many organisms is affected by light. A field experiment manipulating underwater light intensity at night was performed in a suburban lake bordering a large metropolitan area. Diurnal vertical migration of *Daphnia* was significantly reduced in both amplitude (2 m. lower) and magnitude (10–20 per cent fewer individuals) by urban illumination of a suburban lake. Reduced algal grazing by zooplankton at night in the upper layers could potentially contribute to enhanced algal biomass in lakes and coastal waters near urban areas, thereby lowering water quality (Moore et al. 2000).

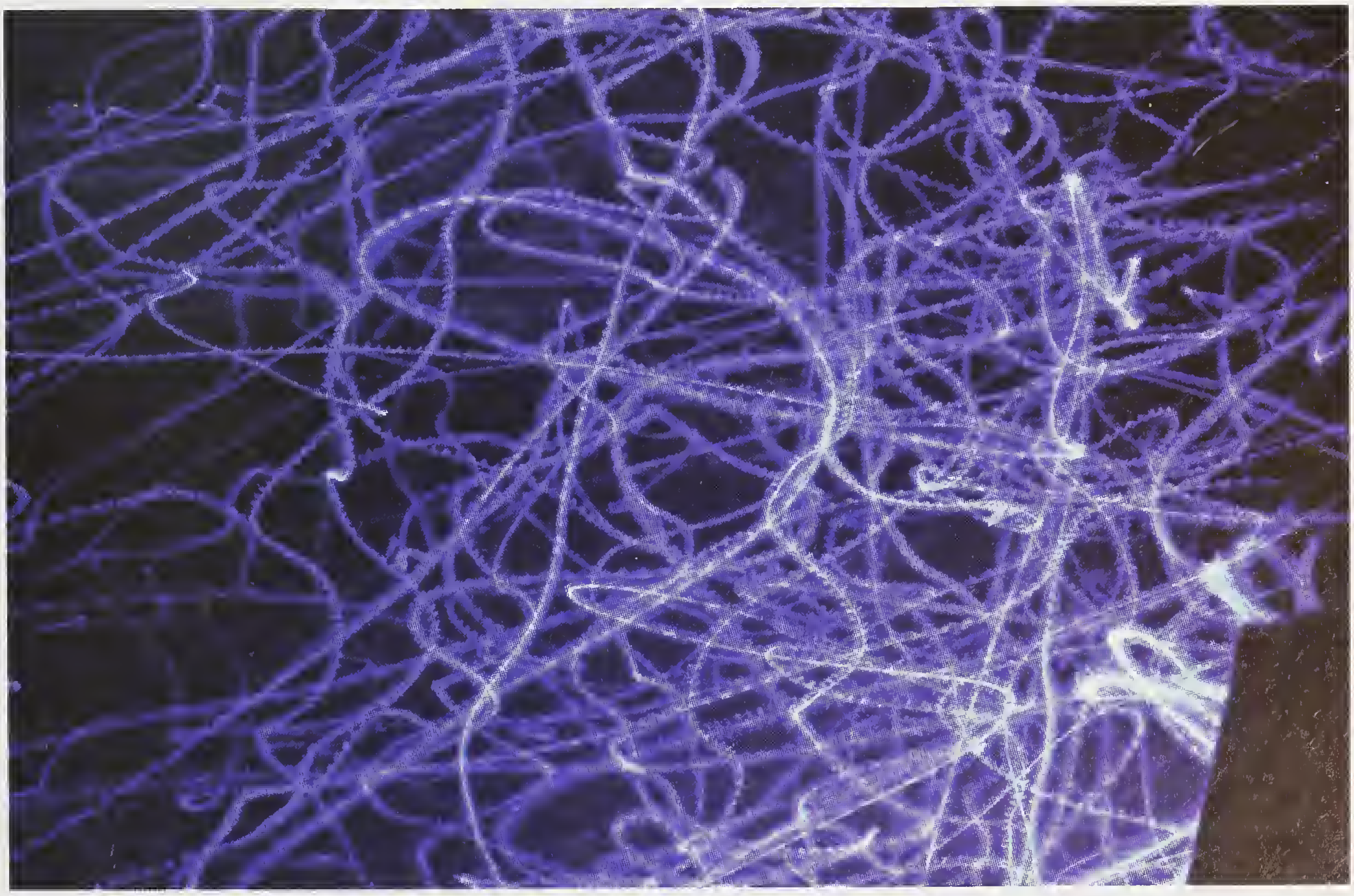

FIGURE 3. Insects attracted to light. *Photo: P. Waring, 2012*

Why do some bat species feed around lights? — (the majority of UK bat species do not). The most well-known effect of artificial light at night is its attraction of insects, especially to high UV content (Figure 3). When attracted to artificial light sources, insects deviate from their natural habitats and from their natural behaviour and also this can lead to demographic losses. Lights could be providing 75 per cent of the insect food resource in an area, as they are drawn from habitat patches to feed around lights (Bruce-White and Shardlow 2011). The draw of insects to artificial lighting has been termed the 'vacuum effect' (Eisenbeis 2006). This insect attraction leads to a reduction in insect density in the environs, leaving light-shy bat species at a significant foraging disadvantage. With the insects removed from the park, cemetery or water body and concentrated in a particular way, is it not surprising that bats will opportunistically feed on a concentrated resource in the same way that dippers will leave streams to feed on blackberries; dormice will eat from bird tables (National Dormouse Monitoring Scheme data); dolphins will feed at the strandline (Duffy-Echevarria et al. 2008); and bears will take fridge stuff. These are high-risk strategies, performed away from areas where these animals **routinely forage**.

Legislation, guidance, policy and good practice

Amendments were made to The Conservation of Habitats Regulations (HR) (2010) to strengthen the protection of features of importance that protected species are reliant upon (should include the effect of LP on waterways, treelines and other linear features that bats are using). This includes **any** disturbance to bats or a disturbance affecting:

- The ability of a group of animals of that species to survive, breed, rear or nurture their young
- In the case of migratory species, impair their ability to hibernate or migrate, or
- The local distribution or abundance of the species.

This may preclude fragmentation of corridors caused by illumination, and a useful discussion of this is provided by Garland and Markham (2007) who attest that although the Bat Mitigation Guidelines (Mitchell-Jones 2004) state that bat 'foraging areas and commuting routes are not legally protected', that there is a legal basis for the protection of these features within the HR, The Natural Environment and Rural Communities Act (NERC 2006) planning policy, and international treaties. They argue that ecological consultants should be putting forward a legal argument for the protection of bat foraging and commuting habitat, rather than solely relying on convincing developers and local planning authorities of the merits of good practice. They give an example of floodlit sports pitches (marinas and roads) illuminating at the same time as bats become active. Should bat movement along these corridors be inhibited by lighting, then this could constitute illegal disturbance.

In a recent High Court judgment in the case of Crystal Palace (Keith 2012), two members of the Crystal Palace Community Association (CPCA) challenged the Secretary of State's (SoS) approval of a planning application. It was accepted by the court that a small impact to a secondary commuting route is a disturbance, which may require a licence, as it causes bats to deviate from their normal flight route (it follows that other similarly mentioned impacts such as lighting, could also be a disturbance). It can be concluded that the courts and legal counsel accept that disturbance means changes to important activities such as foraging/commuting for a bat colony. This might be at odds with what appears to be the accepted view that disturbance involves something likely to lead to harm and should be tied to a roost. By attempting to demonstrate harm we may be creating more work than we need to. We (those concerned to conserve bat populations) only need to demonstrate a disturbance to engage the Regulations.

Dutch Agencies' interpretation of the Directive may be more related to conservation principles and licences are necessary where impacting on flight paths or foraging areas (not tied to roosts). It may be it is the Dutch interpretation that has led to innovative solutions such as the 'bat-lamp'. Licences ensure that flight paths remain functional (e.g., are not illuminated) during and after construction works, or are compensated before existing paths would be affected. Dutch licence applications are in the public domain and open to consultation. In 2009, public pressure caused the competent authorities to decide that no permits were needed in cases where all negative effects would be mitigated. However, in March 2012 a judge decided that this is a wrong interpretation of the Flora and Fauna Act (V. Loehr 2012, and pers. comm.).

The Royal Commission on Environmental Pollution, led by Sir John Lawton (2009) reported on the nuisance caused by badly designed lighting and the effects of artificial light on nature and ecosystems. It stated that lighting should be reviewed on motorways and could be removed from urban parks. Local authorities should attend to the outcome of the trials to examine the impact of reducing or turning off lighting in quieter areas, where there is insignificant use of the roads. The commission concluded that there was a need for government to recognize that artificial light in the wrong place at the wrong time is a pollutant, which can harm the natural environment.

A statement by the Bat Conservation Trust (2011) on 'Lighting and Mitigation for Bats' resolved that smarter lighting, rather than less lighting, is key to mitigating the effects of light pollution. Light should only be erected where it is needed, illuminated during the time period it will be used, and at levels that enhance visibility. Any bare bulbs and any light pointing upwards should be eliminated. The spread of light should be kept near to or below the horizontal. Narrow-spectrum bulbs should be used to lower the range of species affected by lighting and light sources that emit ultraviolet light must be avoided. Reducing the height of lighting columns as light at a low level reduces ecological impact. For pedestrian lighting, low level lighting that is as directional as possible should be used and below 3 lux at ground level.

Central police advice is that pedestrians should not be drawn by the use of lighting, into an area where there are high crime levels (PC Ike Gray, pers. comm., March 2008). Joint policy guidelines issued by the Metropolitan Police and British Waterways (Anon. 2008) state that, 'whilst waterside lighting may be an operational requirement in locations such as lock sides, encouraging access to the waterway after dark may increase levels of criminal activity that would not otherwise occur. Lighting should be used to draw pedestrians away from urban watercourses at night.

During a presentation entitled A Legal Update on Light Pollution, Morgan-Taylor (2012) suggested that paragraph 125 in the National Planning Policy Framework (NPPF), creates an obligation on local authorities to tackle light pollution and introduces the concept of 'good lighting design', which, if clarified for local authorities, may help foster a uniform approach. The benefits in the revised ILP 'Guidance Notes for the Reduction of Light Pollution' and the draft BRE (Building Research Establishment) light-pollution guidance are worth examination.

As mentioned, the European situation varies between countries and may be more tightly controlled in France, Netherlands and Belgium. Neon signs can be no brighter than street lighting (see Appendix 1 for a copy of the legislation). The Flemish 'Control of Nuisance Legislation' requires that open-air light sources should be limited to 'necessities related to operation and safety'. Lighting must be conceived in such a way that 'non-functional emission of light' to the surrounding area is limited. For example, if accent lighting is installed at an historic building, legislation requires that only the building/feature should be lit and not the surrounding areas (or vegetation). Note that some London boroughs are now refusing new applications to up-light buildings (recent increase due to marketing and fashion) and any new lighting of waterways, where there is no existing lighting.

There are courses aimed at those who would like to learn more about lighting in relation to bats (aimed at those with existing experience of bat surveys and mitigation) as it focuses on specific aspects which are often overlooked or not given sufficient consideration. They are based in north Lancashire, Snowdonia and Wiltshire (Waring 2012), and if sufficient demand, can be extended to cover London.

The courses content includes sessions on:

- Artificial lighting and measuring light levels
- Bats and lighting — what we know
- Bats and lighting — what we think is the case
- Implications for bat surveys and mitigation.

Enabling participants to take measurements of light levels; make confident judgements about lighting and impacts on bats as well as make detailed comments on lighting scenarios in relation to impacts on bats.

The legislation, guidance and policy section is stronger and longer (Fure 2006) so why is LP a bigger issue, with new lights appearing in parks, along waterways and up-lighting the most nondescript of buildings. There was a 24 per cent increase in LP in the UK between 1993 and 2000. The South-East is the worst area of Britain for LP, with only 1 per cent of land being classed as a 'truly dark' area (CPRE 2009). In the last five years so-called lighting improvements have been implemented on many of the rivers and canals in the region. Light levels along the Thames and Grand Union Canal are probably the highest, in contrast there are some stretches along the Regent's Canal, still unaffected by illumination (Fure and Wedd 2006, 2007) as well as stretches of the Lee Navigation (Fure and Chipchase 2006–2007). Lighting along London's rivers, especially the Thames, can be seen by clicking on the link in the reference list (Figure 4, courtesy of the Dutch astronaut, André Kuipers and ESA/NASA 2012).

In summary: even moonlight will alter bat behaviour. Lighting of commuting routes and foraging areas will ensure a reduction in activity. The Habitats Regulations is sufficient to restrict illumination onto some natural features used by bats. Illumination falling onto a feature or a commuting route used by a maternity colony to nurture their young is illegal. Bat Conservation Trust

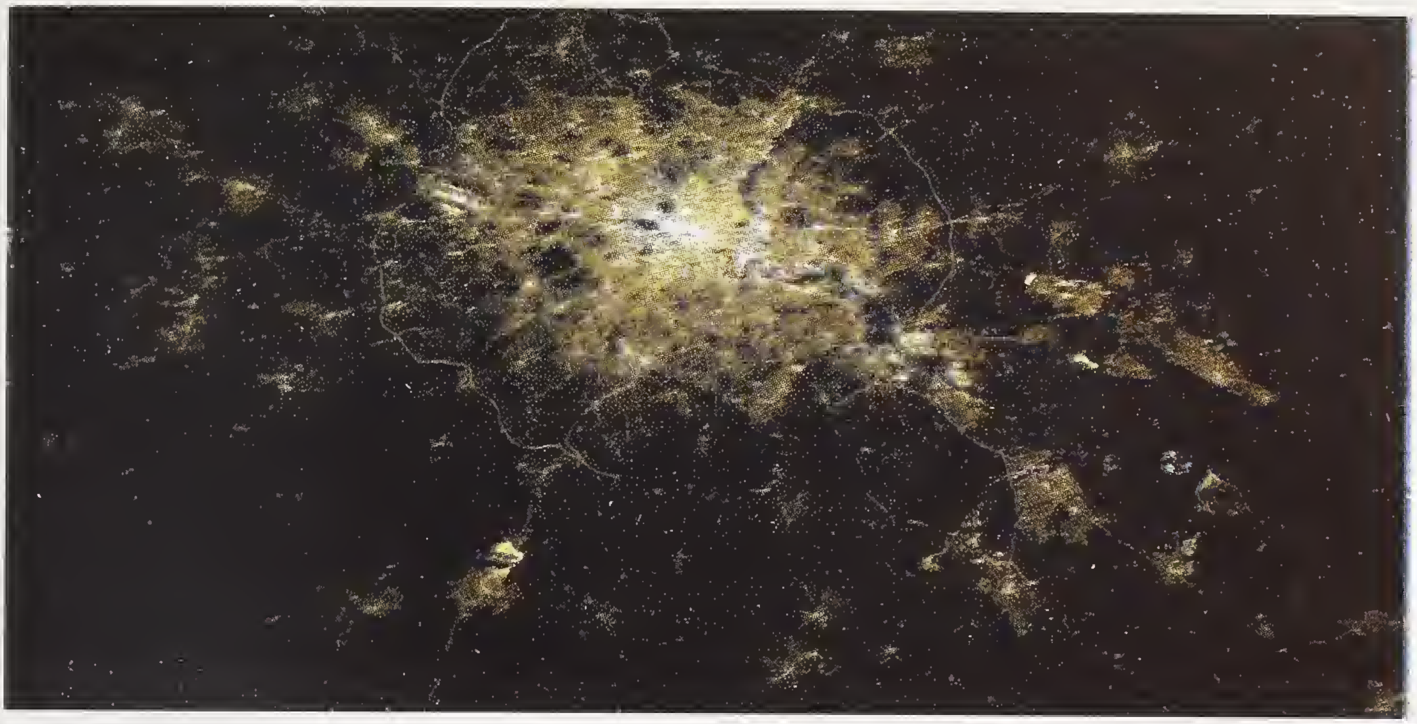

FIGURE 4. Lighting along the Thames (Kuipers 2012). *Photo: A. Kuipers*

Guidelines are changing, converging with other organizations. A joint leaflet with Buglife warns of the undesirable effects of too much lighting in the environment, appeals for reductions in light levels, hours of use and restrictions on the use of ultraviolet light. This is the strongest advice yet giving the subject the clarity it deserves and should be consolidated by new guidance awaited, some of which may target illumination along rivers. Hopefully it will be stronger on the licensing issue in the future. In the meantime, ecologists should be leading on this issue. Waterways should remain dark to prevent adverse effects on insect resources, whilst safeguarding the potential for nocturnal wildlife. Is our legislation too complex to be enforceable, or are we too embarrassed to fight for beauty or protect that 'Site of Special Scientific Interest' that is the night sky (Mirzon 2012). To be effective, policy objectives need to consider the cultural, social, energetic, economic and ecological impacts of future lighting technologies (Stone et al. 2012).

When to light

Along a 2.5-metre stretch of one small river in north London, there have been three floodlighting schemes in as many years, which bat reports are still supporting. Every year, each London borough receives planning applications for lighting projects (Planning Portal and author's data, 2006–2011) ranging from floodlighting for sports pitches, up-lighting of historic buildings as well as entirely new schemes for parks. How can this be when these areas are designated as wildlife corridors?

When considering an application, any proposal for illumination (both the rationale and the user/s), its use should be limited to fulfil that rationale or support that user. If the user is not present then the lighting should not be employed. For example, if security lighting is employed, there should also be a means of identifying and reacting to breaches in security. Another example relates to cyclists as users, their safety and night vision. There remain few unlit areas of towpath left in London, chiefly along stretches of the Lee Navigation and the Regent's Canal, where there is pressure to extend lighting to these areas. Human retinas have two types of receptor cells called rods and cones. Cones work in bright light and register detail. The rods see in black and white and do not discriminate colours. In a dim-light environment, with one or two bright pinpoint lights, a person sees with both the cones (for the bright light) and the rods (for the dim light). Prolonged viewing of a bright light in a dim field causes the pupils to close to smaller sizes and may desensitize the rods, temporarily reducing our ability to see in dim light. The issue is the chemical in the eye, rhodopsin, commonly called visual purple, which is broken down quickly by light. Once the bright light is gone, the pupils open up again and the rod cells resensitize, thus restoring night vision, although it takes time for true night vision to be recovered. This is about 10 minutes for 10 per cent, 30–45 minutes for 80 per cent. This clearly has implications for cyclists approaching and exiting a lit area, as this may have an adverse effect on their night vision.

In the case of lighting in response to rising crime levels, additional discussion with local police may reveal that a location earmarked for raised illuminance, is actually an exit point for criminals, **not the crime scene.** Police crime prevention design advisors, if consulted, may state that the existing lux spillage from multiple light sources is already fit for purpose. It is worth bearing in mind that even if users have been misidentified, changing established illuminance levels can be very difficult, even with the support of different user groups.

One method of demonstrating if footpath or towpath lighting is needed, is not necessarily by a survey of the bat activity. This is often requested, but in most cases does not make a difference to the outcome, unless it affects a nearby roost. If no bats are observed during surveys, negative survey results are often used to bolster an application. By surveying the existing illuminance, with a logging light meter and plotting the readout against grid references, it can be shown that night-time levels may already be adequate for safety standards (ref: police design advisors and BCT advisory). Council officers, not having had the benefit of night visits to these sites, may decide that lux levels presented are of sufficient magnitude. Illuminance onto water can be gleaned from a logging light meter mounted on a one-metre pole, projecting into the mid-stream. Boats can also be used for this purpose where there is no access to the towpath, but at greater cost (Table 2). If the light levels are 25 lux at the mid-stream, as in this example, then clearly something is wrong and there is a case to substantially reduce the light levels, not increase them.

TABLE 2. Illuminance (lux) recorded by boat along the Regent's Canal (Fure and Wedd, 31 August 2007).

Lux levels	GPS
25.7	TQ2837783933
25.4	TQ2843583992
24.5	TQ2837783933
6.1	TQ2837783933
2.0	TQ2837783933
2.0	TQ2837783933
1.6	TQ2837783933
1.5	TQ2837783933
0.0	TQ2843583992
0.2	TQ2843583992
1.4	TQ2845384002
1.5	TQ2845384002

Leaflet

There are many ways of directing light where it is needed and there is a wealth of guidance on bulb types, luminaire design, hoods and cowls and height of columns from BCT, Buglife and ILP, which is not repeated here. But where a river or canal is designated as a wildlife corridor and the public footway ends, **unmitigated light spillage onto the riparian vegetation and a potential bat flyway (from windows, security lights, accent or streetlights), should be seen as a form of discarded litter or anti-social behaviour.** Why does negative bat survey data suggest that lighting will have no impact on a bat species and therefore can continue. When, in fact, this approach guarantees that any potential for bat activity will be removed forever. Various leaflets are in preparation specific to bats and LP/watercourses. By the time this is printed one should be available to download from my website, specific to south-west London, available for use or adaptation.

LED case studies

Lighting schemes attempting to address the protection of dark corridors sometimes use LEDs. LEDs do not produce UV, but can have strong emissions in the blue region of the spectrum (especially the ‘cool white’ type). Preliminary results from a survey regarding insects and LED lamps have been released and show a low insect attractiveness, which can be compared to that of the low-pressure sodium lamps (Eisenbeis 2010, Eurobats 2010). LED lighting which has a negligible UV component may be of benefit to bat populations (Morrison 2009) although not if it illuminates a feature used by bats to travel (Stone et al. 2012).

London’s Arcadia was granted funding to implement a lighting scheme, which could have less impact on nocturnal species than the existing arrangement. The old lighting system was a mixture of different luminaries, columns and distances between lights, which caused light spillage onto the riparian vegetation and the water surface. The Arcadia Project implemented consultation with the local community and the lighting system was designed by Philips. Illumination is at 20 lux ambient light level (lower than the standard 55 lux). The LEDs are 30 watts (street lights about 70 watts). When used along the Warren Footpath, light spillage was removed from the River Thames, whilst directing the lighting to the footpath, where needed. Figures 5 and 6 show how light trespass falls short of riparian vegetation. The view south from Richmond Bridge (Figure 6) demonstrates the darker right hand side as opposed to the left hand side, which suffers illumination (note the value of vegetation screening). The lights have a flexible Control Management System (CMS) which allow luminaires to be remotely monitored and individually controlled. Bespoke dimming regimes can be installed or selected luminaires switched off and the lamps reduced to 5–1 lux at times of predicted low usage: the key is in the ability to control and dim them and thereby remove any impacts from wildlife features. The system works but only because it is dynamic in nature and spillage can be directed away from the feature. The light can still be seen by bats and will alter their behaviour.

The same company recently developed amber-coloured LED street lights with a wavelength of 600 nm, used in some areas of Holland (Gilze, south Netherlands) with good success as the lights allow humans to see whilst minimizing disturbance to bats, although bats can still see this light. In this country similar lamps are marketed by Philips as ClearField, which include

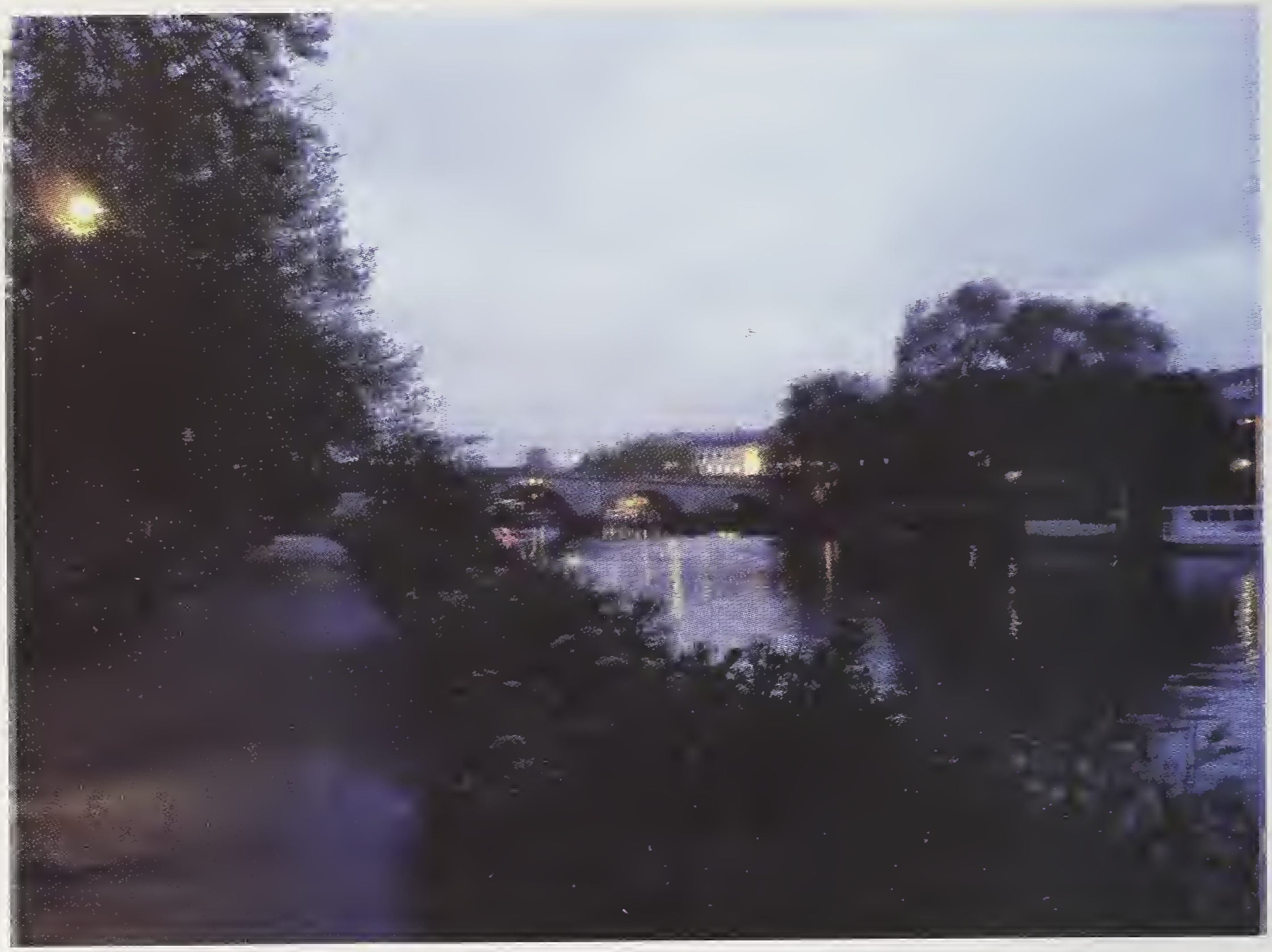

FIGURE 5. Richmond bridge, view north. *Photo: A. Fure*

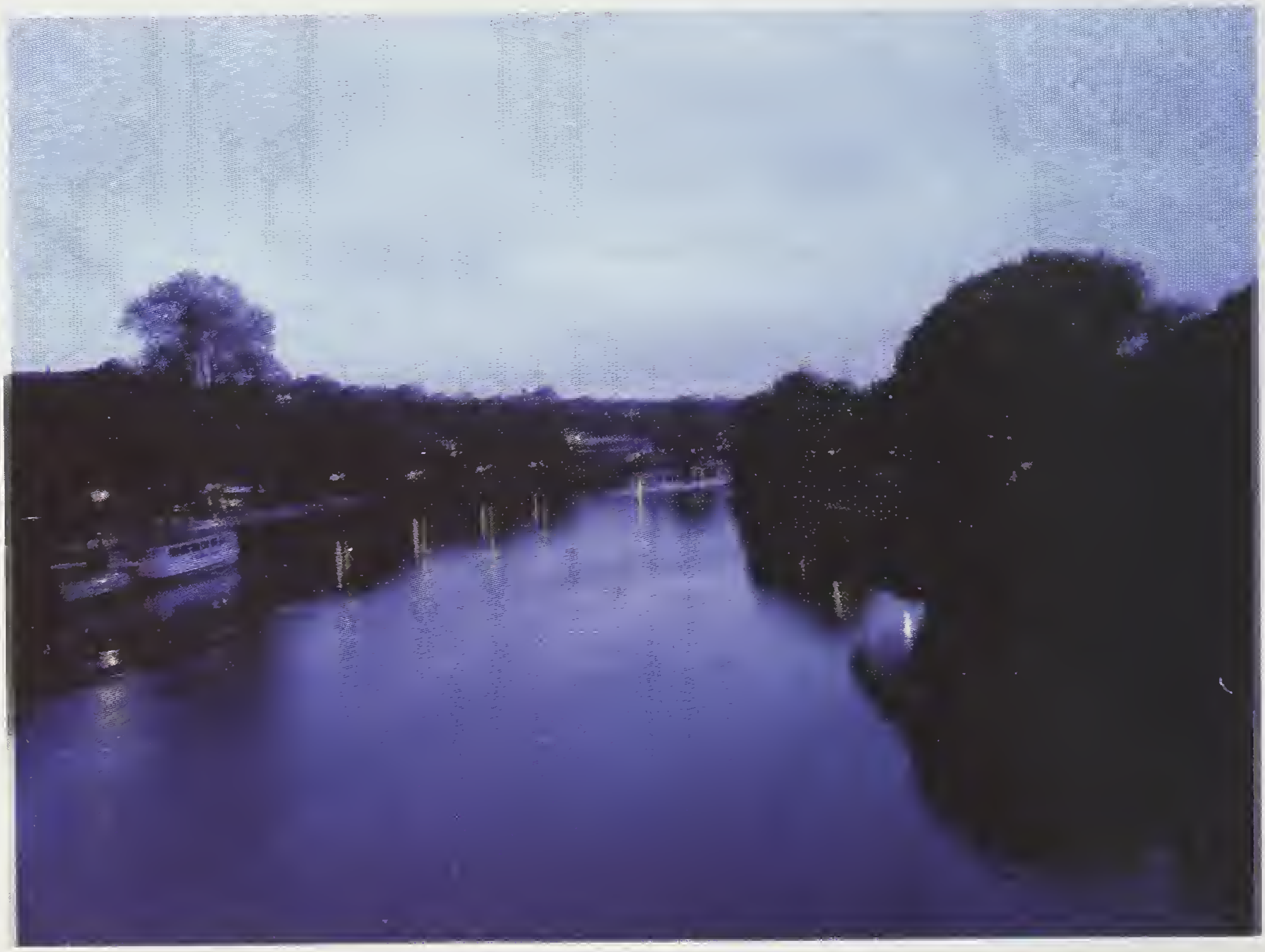

FIGURE 6. Richmond bridge, view south. *Photo: A. Fure*

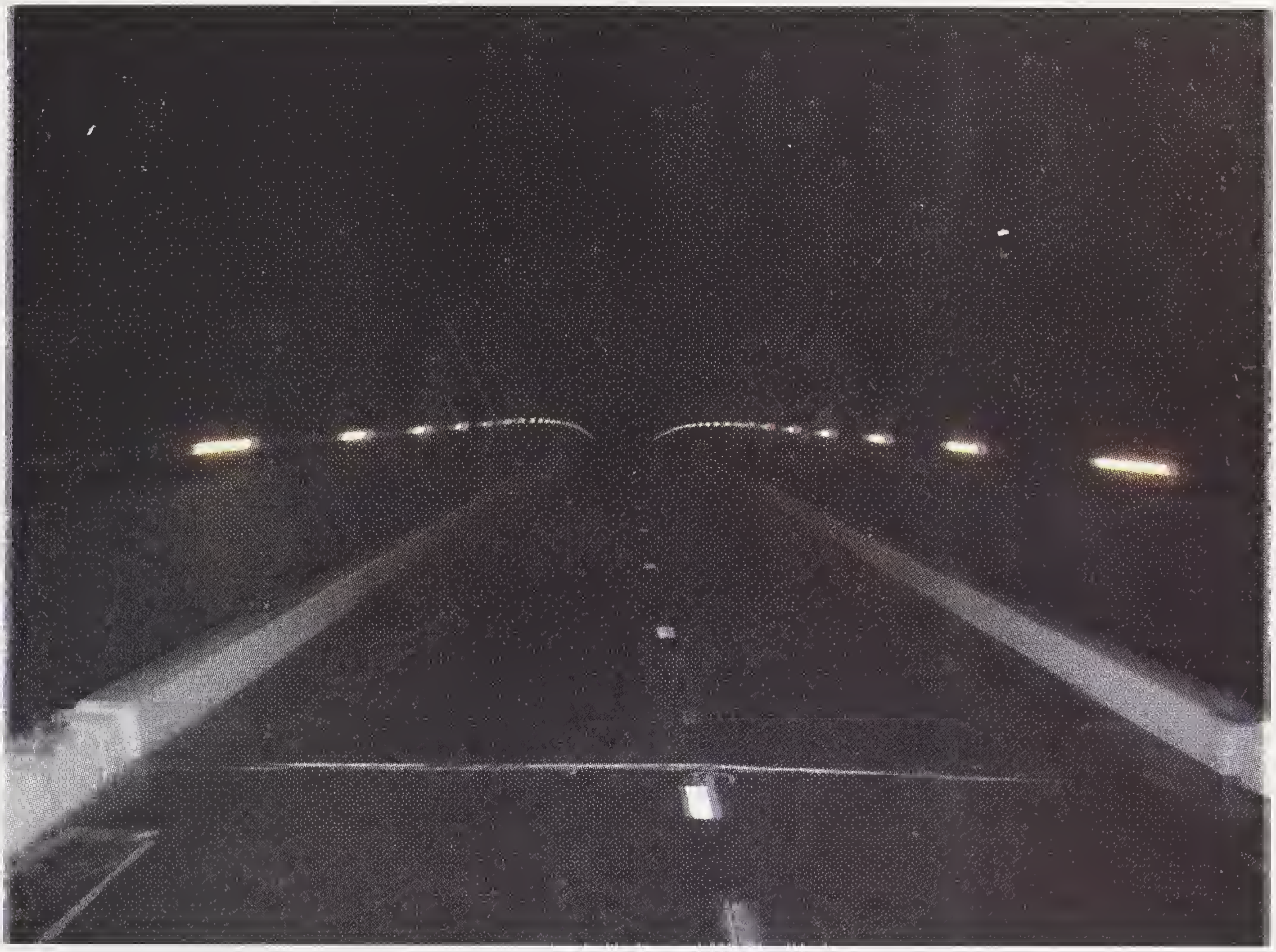

FIGURE 7. Narrowband amber handrail lights over the A74 bridge at Tegelen, Netherlands. *Photo: H. Limpens*

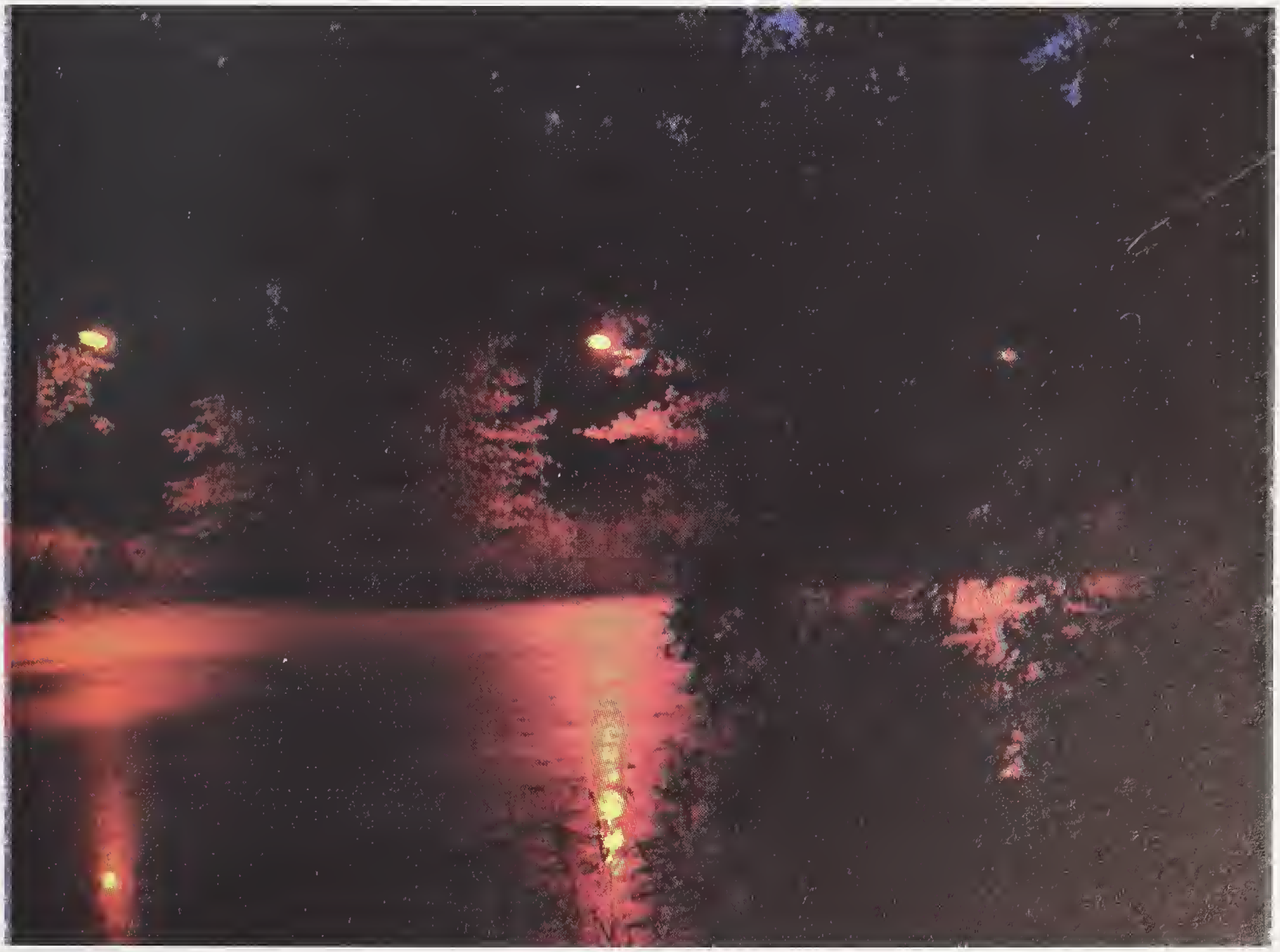

FIGURE 8. Narrowband LED street lights at Tegelen, Netherlands. *Photo: H. Limpens*

small amounts of light at frequencies in the green and blue spectrum. Beware of the aggressive marketing of other companies, as some LEDs have a phosphorous content (wavelength 590 + 80 nm) and there are no empiricle studies supporting their use for bats at present.

There is a difference between the ClearField lamp, created by Philips and the Amber lamp created by the Dutch company LEDexpert, the Dutch Mammal Society and the Dutch Road Agency. The Amber LED 'Bat Lamp' is a narrowband amber colour (590 +/- 20) patented by the Dutch Roads Agency, for use by all. The Amber LEDs are installed under licence as mitigation, at the national highway A74 at Ulingsheide, Tegelen, where a parallel road abuts a larger green bridge and important bat flight paths. Narrowband Amber is employed along with a dynamic lighting system, reacting on pedestrians or cyclists, but ignoring cars. Narrowband Amber handrail lighting is installed over the A74 bridge at Tegelen (Figure 7) and as street lighting (Figure 8). A monitoring scheme to test the overall effectiveness of the 'bat lamp' is being prepared (V. Loehr 2012, and pers. comm.).

Note: The amber LED was not patented by the Dutch Roads Agency (it has existed for about ten years), but its use in a lamp to avoid any effect on bats is new, hence the name 'bat-lamp'. There is only a minor price difference between conventional LED illumination and bat-lamps.

New lighting along waterways is **not** recommended where not currently provided, especially where light-shy species are known. Where illumination is already present and causing spillage onto areas where it is unwanted, it may be mitigated by other means. Louvres have been specially manufactured to replace less-effective shields on high-pressure sodium (HPS) lamps, creating a light corridor in a dark area, without encroaching onto the canal (Grand Canal Dublin, Naper 2010).

Light pollution from windows and security lights has transformed the Grand Union, Regent's and Hertford Union Canals, where warehouses are now converted to grand apartments. Industrial buildings were once dark and undisturbed at night but the new apartments have an array of light sources, much of it from windows. Windows on the canal-side could have window film or low transmittance glass or built with ready installed blinds. Pilkington Optifloat can be used for this purpose and grey has the lowest light transmittance of 39 per cent, this means that 61 per cent of the out-coming light will be absorbed. Size of windows over a watercourse (or protected area) can be reduced by 50 per cent to reduce light spill. Residual light spillage will attenuate quickly in these circumstances and have less impact on foraging bats.

Light curfews for sports pitches, even when subject to planning conditions, will not be enforced so don't ask for them unless annual compliance checks are included. Post-development monitoring is where mitigation measures tend to fail as there is no independent system of compliance checking. At a recent conference (DMU) there was said to be a surprisingly poor compliance between lighting schemes and planning permission (Lummis 2012). Luminaires could be of a totally different type to those agreed at the planning stage, columns were higher or lower or of different materials.

For this reason it might be useful to create pro formas that a lay person could usefully employ to check the compliance of a lighting scheme against plans (Appendix 2). In a local authority situation a biodiversity officer might be able to undertake a compliance check, alone or with a local authority lighting engineer. Luminaires and cowl types, as well as other terminology can be obtained from the website of the ILP. The original proposed lighting scheme should be attached to the compliance check form. Height of columns can be checked with a laser measure. We can only access information about the success of the Mitigation Measures if this information is shared. Please log your success on the Yahoo Group. http://groups.yahoo.com/group/lightsandwildlife/

Light from multiple sources has blighted so much of our region that we have lost all control, and in some cases, we no longer have the ability to prevent unwanted illumination onto water courses, leading to spillage of 25 lux at the mid-stream of a so-called wildlife corridor. Given what we know about the effect of lighting on insect behaviour, bat foraging and commuting behaviour, the answer to the question 'how much lux onto an important feature used by bats (waterbody or treeline) is most appropriate?', the answer is determined to be 'none'. Where light provision will affect/change bat behaviour (no need to show harm) a licence should be sought and the disturbance effect should be mitigated. In our region there will always be lighting beyond control contributing to skyglow but if this standard is set for waterways then everything else should follow. There may be exceptions for operational reasons, but then lamps should only be illuminated when the user is present, not automatically programmed to operate 365 days a year, when only used once in that year. To achieve below 1 lux, a distance of several metres might be needed between the feature and a lighting unit, depending on the height of columns, unless mitigated, by the use of louvres on existing lights, narrowband amber LEDs when replacing existing lights, and the use of low-transmittance glass or window film on windows near water. The cumulative effects of lighting including the 'vacuum effect' is pushing bats and their prey nearer to the edge of existence in some areas of London, while for the majority of the time that these lights are burning, we rest safely in our beds.

Acknowledgements

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APPENDICES

APPENDIX 1. Order of the Flemish Government of 1 June 1995 concerning general and sectoral provisions relating to environmental safety

Chapter 6.3. Control of nuisance due to light.

Article 6.3.0.1. Without prejudice to other regulatory provisions the necessary measures must be taken to prevent light nuisance.

Article 6.3.0.2. The use and the intensity of light sources in the open air are limited to necessities related to operation and safety. The lighting must be conceived in such a way that the non-functional emission of light to the surrounding area is limited to the extent possible.

Article 6.3.0.3. Emphasis lighting may only be aimed at the establishment or parts thereof.

Article 6.3.0.4. Illuminated advertising may not exceed the normal intensity of public lighting.

APPENDIX 2. Post-installation compliance check — sample pro forma

Please use this to make choices about how you want to monitor lighting schemes. The greyscale is purely for guidance and as an aide-memoire. I will provide an adaptable version on request.

Section A: Scheme details		
Planning authority:	**Planning Application Ref. No: (if available)**	
Location:	Reference: *Guidance Notes for the Reduction of Obtrusive Light GN01:2011 ILP* (Includes new environmental zone, terminology, guidance and pictures of luminaire and cowl design).	
Protected species / BAP interests (where appropriate)		
Ecological consultant:	**Planning officer: (if known)**	
Section B: Details of USER		
User	Who is the user/observer	Action
Has the user been identified		
Has the observer been identified		

Section C: Details of LIGHT		
Height of column (use laser measure)	The lower the less travel	
Type of lamp	Low-pressure sodium lamps (SOX). These provide orange light. This light is emitted at one wavelength only, and contains no UV light. They are large and therefore the light is hard to direct. High-pressure sodium lamps (SON). These provide a pinkish-yellow light. Light is emitted over a moderate band of wavelengths including a small amount of UV. Insects are attracted to these and they are of medium size, making them easier to direct. Mercury lamps (MBF). These provide blue-white light and contain a large component of UV light. Insects are attracted to these in large numbers. Insects are attracted in large numbers to lamps emitting UV radiation (Wavelength 350–400 nm) Light-emitting diode (LED) lamps are long-lived and very efficient, produce a narrow beam and provide instant light. LED wavelength, and therefore their colour, can vary from the near-infrared, through visible to near-ultraviolet light. White LED lamps have a broad spectrum of light. Their wavelength peaks at 450 nm and they therefore emit much more blue light than high-pressure sodium lamps. Red, yellow and amber LED lamps each have a specific, narrower spectrum and have peak wavelengths between 590 and 660 nm.	
Full cut-off, louvres	If you can see the bulb there will be glare	
Glass (flat, bowl)	Shallow bowls provide efficient lighting due to their ability to allow light to pass out of the luminaire at high angles – therefore giving large distances between lighting columns. However, the disadvantage is that there is a small loss of control in that light is emitted sideways or upwards. Flat glass tends to be less efficient as light is reflected off the inside of the protector and absorbed back into the luminaire. The advantage is that there is no light emitted above 90 degrees and will best protect a feature.	
Glass protector	to reduce UV	
Sensors: trigger distance		
Summary of findings (if applicable) **Lux measurements on path 3 recommended by BCT** **Buffer width between light and feature (e.g. 1 metre)** **Illuminance levels on water surface**		
Section D: Mitigation Plan summary		
Summary of mitigation measures to be implemented		
Green wall to provide shield	e.g. Russian vine in gardens; old man's beard near open space	
Remedial works needed Will be affirmative if >0.25 (moonlight) light spillage reaches the feature	**YES**	**NO**

Red deer in Richmond Park: birth to death

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Abstract

In Richmond Park during eleven calving seasons (1965–1975) 262 red deer calves were tagged within a day or so of birth. By December 1980 the fate of 119 of those deer was known: 100 had been culled and the remainder had died as a result of road accidents or from miscellaneous causes. Years later, two more old tagged deer died. Specimens were obtained routinely from culled deer (tagged and untagged) and many whole bodies were examined when accidental deaths occurred. This belated report indicates some of the findings. Further work (e.g. osteological studies), is in progress.

Introduction

Richmond Park lies fifteen kilometres south-west of London and occupies 950 hectares, the same size as when it was first enclosed in 1637. The history of the Park and its deer is thoroughly described by Brown (1985). At the time of this study the deer population consisted of 300–400 fallow deer *Dama dama* and 250–350 red deer *Cervus elaphus*.

The late Donald Chapman (1935–1982) was granted permission to ear-tag newly born deer of both species. The prime reason was subsequently to obtain specimens from dead deer of known age. For animals shot in the annual culls we were able to obtain heads, feet and reproductive organs. Each cull was given a reference letter and each animal a number. Red deer stags and fallow bucks were culled in August and September, females of both species from November to January. When deer were killed in accidents we usually had the opportunity to make post-mortem examinations, thus often obtaining specimens during the close seasons. For fallow deer many of the findings have been reported (Chapman and Chapman, 1975, 1997) but less has been published for red deer.

Methods

The appropriate licence was obtained from the Nature Conservancy Council for marking the calves. The tags used were plastic Jumbo tags (Dalton's Ltd). In the left ear the colour of the tag denoted the year of tagging and bore a number unique for each calf. In the right ear the tag was plain but usually the two halves were of different colours, thereby increasing the number of combinations.

Much of the Park is grassland, with extensive areas of bracken as well as plantations with a ground cover of leaf litter. All of these habitats contained suitable calving sites. The procedure was for one or two, occasionally more, people to walk slowly and systematically, diligently searching. Once a calf was found it was gently restrained, tagged, sexed and in some instances weighed in a sling on a spring balance. It was then left where it was found, so handling was minimal and brief. Most of the calves weighed were believed to be less than one day old; a few were believed to be one to two days but older calves caught were usually too active to be weighed. When a birth was witnessed from a discreet distance, the location was noted and returned to later.

Calving season

Over the years the span of dates during which calves were sought was May 23 to June 21 but the dates varied between years (Table 1). Of the 262 calves tagged, 134 were males, 127 females and one was not sexed. Births outside the calving season were rare, e.g. one example in September was reported by the Superintendent.

TABLE 1. Number of calves tagged in each year.

Year	Dates	No. calves tagged
1965	3–23 June	13
1966	14–17 June	4
1967	12–19 June	2
1968	27 May–16 June	47
1969	31 May–21 June	45
1970	29 May–21 June	28
1971	31 May–16 June	17
1972	23 May–16 June	36
1973	3–13 June	16
1974	26 May–15 June	22
1975	1–14 June	32
	Total	**262**

Weights of neonates

The ranges were: for 59 males 4.1 to 11.1 kg (mean 8.7 kg.); for 53 females 5.4 to 11.3 kg (mean 8.5 kg). Although not all actual birth weights, they indicate the range of weights of fairly new-born calves. For 47 calves (sexes combined), within twenty-four hours of birth their mean weight was 8.15 kg, considerably greater than the 6.75 kg and 6.47 kg recorded for both sexes at two localities in Scotland (Mitchell and Lincoln 1973).

Singletons

All known live births were of singletons. However, on 6 June 1970 a two-year-old tagged hind delivered still-born female twins, weighing 4.3 kg and 3.8 kg (Chapman 1984). The occurrence of twins in this species is extremely rare: two cases have been reported from Scotland (Guinness and Fletcher 1971; MacNally 1982). Of 222 uteri examined from culled pregnant females each was carrying a single embryo: 46.4 per cent were in the left horn of the uterus, 53.2 per cent in the right horn.

Neonatal fatalities

During our searches occasionally dead neonate red deer and fallow deer were found. Two typical examples in 1972 were one dead calf, already pecked by crows, that had walked, as judged by the wear on the rubbery tips of the hooves, and another that had been still-born. However, that year saw an unusually high and diverse incidence of deaths during the calving period. Two young calves were road deaths and another was found dead a few days after it had been rescued from Beverley Brook. More unusual were the three hinds shot because of their difficulties at parturition. In one case the calf was taken by the deer-keeper for hand-rearing but died a week later. Another hind was shot because she showed severe signs of distress: a half-born dead calf was stuck in the birth canal. The third hind was carrying a calf with two deformities: torticollis (wryneck), with the head and neck deviated to the right side, and deformed hind feet. The latter condition resulted from marked contraction of the extensor tendons. The same deformity of the hind feet was seen in a calf that was found dead. Had it lived to walk, the distal ends of the cannon bones would have been in contact with the ground.

Late winter mortality

Another season when losses of young deer occurred in some years was late winter and especially March, when the animals were nine or ten months old. Examples included two tagged male calves: one died when 44 weeks old in early April 1969, and the other died when 39 weeks old in March 1970. Three other cases in 1979 and one each in 1969 and 1970 occurred, all of untagged animals. These deer were termed 'wasters' and were characterized by emaciated appearance, scouring, low weight, absence of fat and presence of unusually many lungworm *Dictyocaulus viviparous*, lice *Damalinia longicornis* and keds *Lipotena cervi*. Several had healed breaks to ribs.

Culled deer

The age ranges of tagged red deer at the times of culling are shown in Table 2. Most (58.8 per cent) were under three years of age. During the female open season male as well as female calves could be shot, it being good practice to take the calf as well as the hind rather than leave the calf orphaned during the winter. Half the hinds culled in November and December were lactating and some were still suckling in the first week of January, and perhaps for longer. The ages shown in Table 2 are representative of the ages at which untagged deer were also culled, the presence of tags having no influence on the selection of animals to be culled.

TABLE 2. Ages of ninety-seven culled tagged red deer: 1968 to 1976.

Age in months	**Males**	**Females**
5–7	7	6
14–19	3	19
24–31	14	8
38–42	12	2
51–54	5	7
63–65	4	2
75–78	1	5
87–90	1	1
Total	47	50

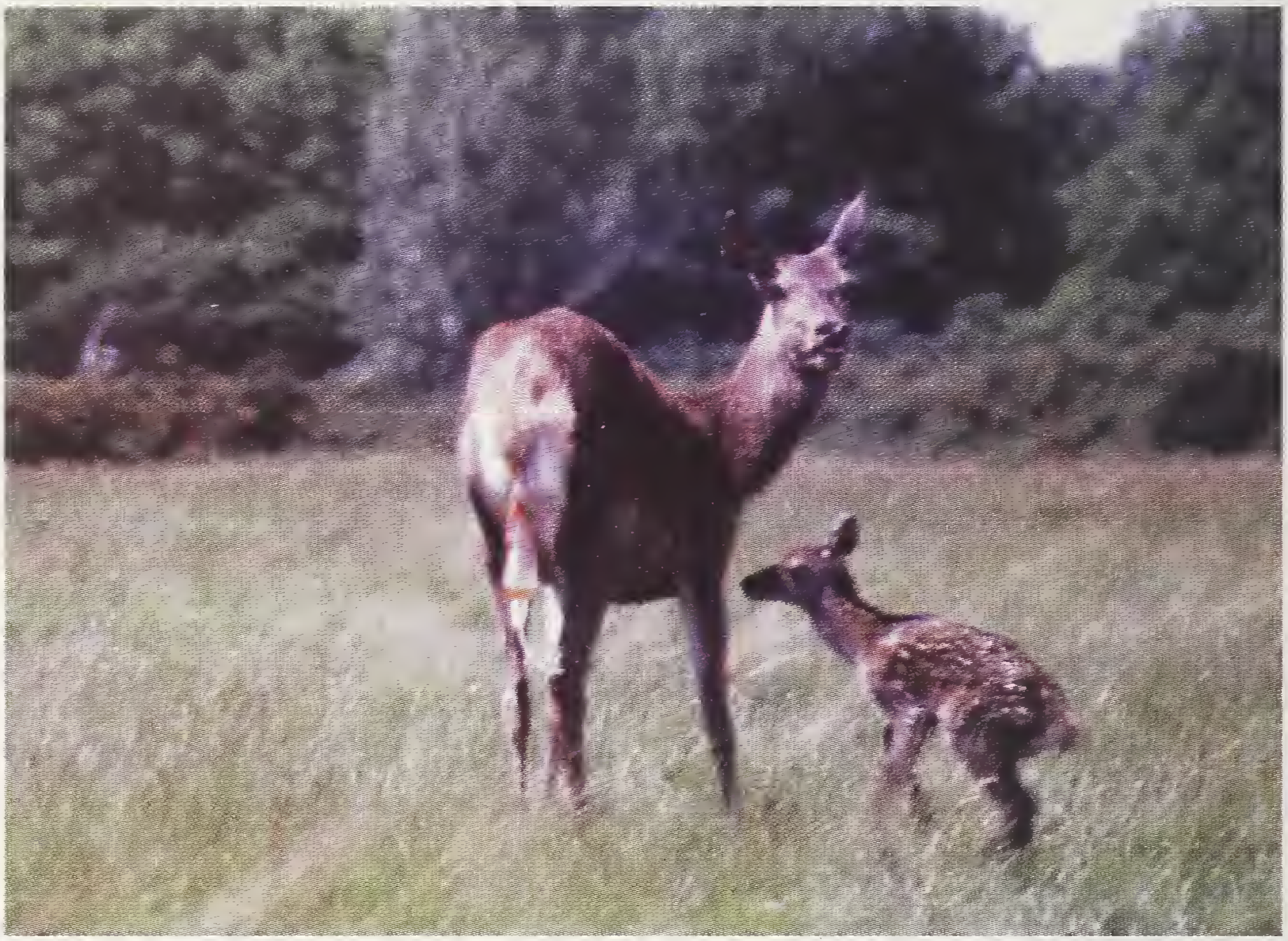

FIGURE 1. Newborn red deer calf: afterbirth hanging from its mother. Richmond Park, 1 June 1973. *Photo: J. W. Fawcett*

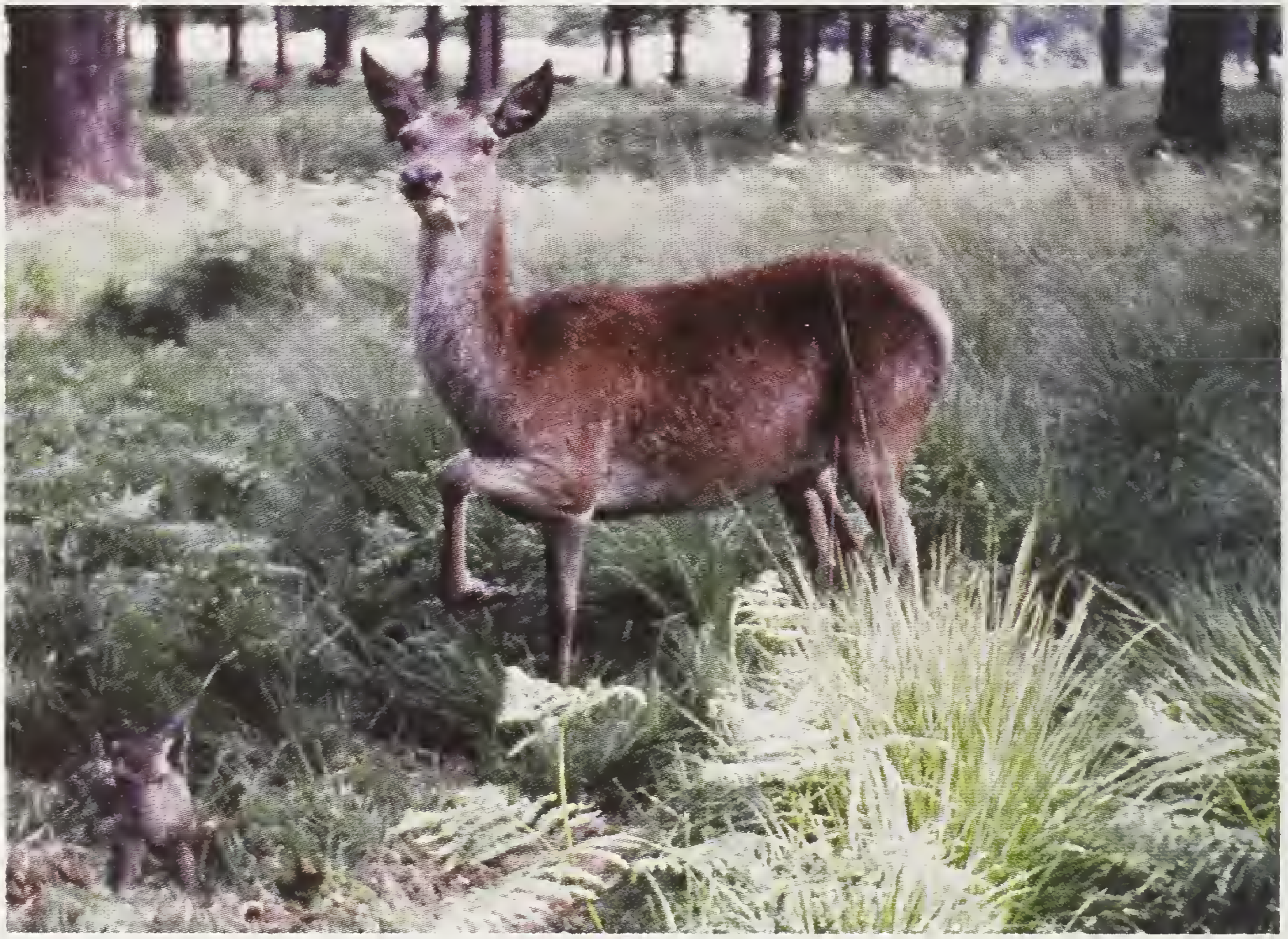

FIGURE 2. Red deer hind, vigilant and protective, with newborn calf. Richmond Park. *Photo: J. W. Fawcett*

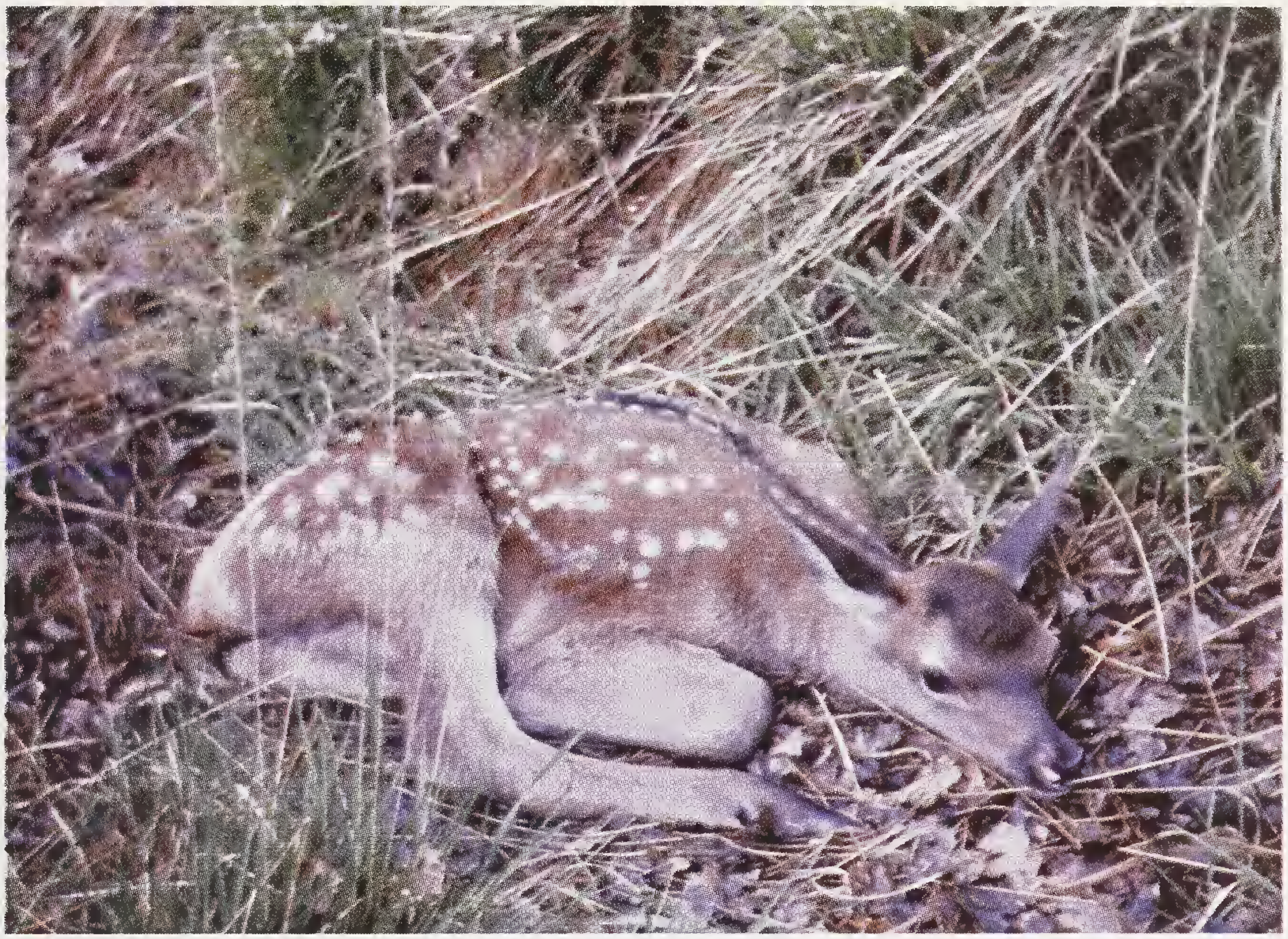

FIGURE 3. One-day-old red deer calf, pelage blending with the leaf litter. Richmond Park.
Photo: J. W. Fawcett

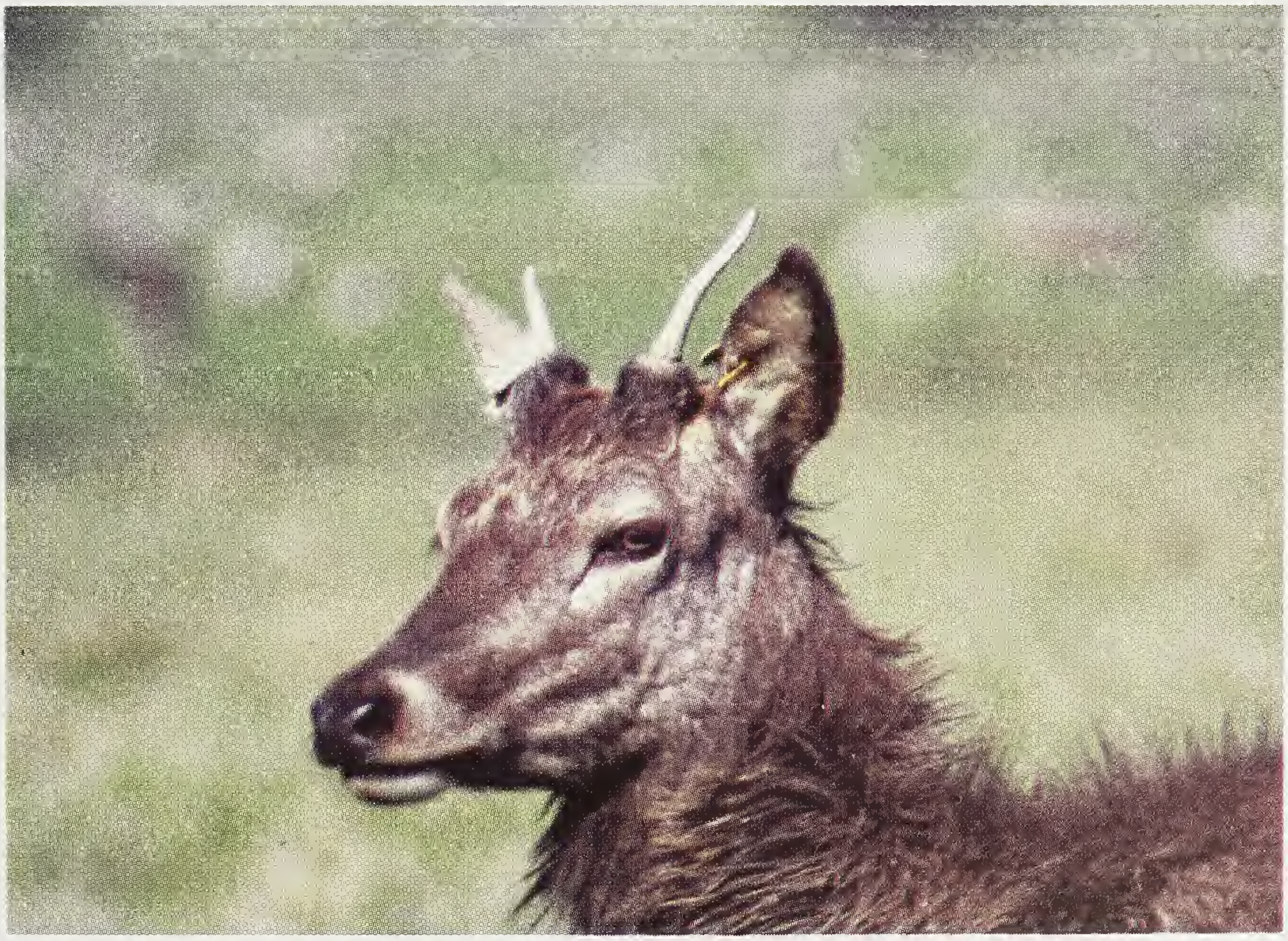

FIGURE 4. Red deer pricket, No. 99, 5 May 1970. Tagged 8 June 1968, culled 26 August 1970. Richmond Park.
Photo: D. I. Chapman

Other causes of death

The roads within the Park carried much traffic: 21,139 vehicles were recorded in a twelve-and-a-half-hour period on 18 October 1973 (Brown 1985). Inevitably collisions with deer occurred, necessitating humane dispatch. Red deer suffered fewer losses than the fallow deer; those hit were mostly less than one year old. Fourteen tagged red deer were shot because of injuries sustained in road accidents or combat with other deer or from unknown causes.

Examples of miscellaneous reasons for tagged deer being dispatched included a male (two years, three months) with a sack over his head, a three-year-old male with a suppurating wound, and a ten-year-old tagged stag shot because his antlers had 'gone back': the beams measured 13 cm and 36 cm respectively but carried no tines. A two-year-old tagged male was shot because he had 'staggers'. This neurological disease (enzootic ataxia) is manifest by incoordination of the hind limbs, similar to swayback in sheep and probably associated with copper deficiency. It could be coincidence that blood from this animal tested positive for *Leptospira latavia*. Of thirty red deer tested for fifteen types of this bacterium only one other gave a positive response, but so weakly as to be insignificant.

The value of specimens of known age

Examination of the reproductive organs enabled the age of puberty to be known: an important factor when assessing the rate of recruitment into a population. In the Park females usually conceived in their second autumn, at sixteen months of age, and gave birth around the time of their second birthday, a fact substantiated by observations of tagged deer with calves. Chapman (1974) reported that 88 per cent of sixty-seven yearlings and 97 per cent of older females were pregnant. In the harsher environmental conditions of parts of Scotland many red deer do not conceive for the first time until over two or even three years old (Mitchell and Lowe 1967). The males in Richmond Park also reach puberty at sixteen months (Chapman 1970), but the social hierarchy would prevent participation in the rut at this age.

From 113 mandibles from tagged deer, aged from five months to eleven and a half years, observations were made of tooth development and wear. By examining radiographs ten developmental stages were defined (Brown and Chapman 1991*a*). With very few exceptions full development of the permanent molars and premolars was achieved by thirty-eight months, with the third molar being the last to reach stage ten (closure of the root apex).

The ages at which individual permanent teeth came into wear, i.e. occluded against a tooth in the upper jaw were:

	Molars			**Premolars**		
Tooth	1st	2nd	3rd	2nd	3rd	4th
Age in months	0–5	13	26	26	26	26

These ages are in very close agreement with reports from Scotland and Germany (Brown and Chapman 1991*a*). A scheme to score the degree of wear was devised to assess the age of deer of unknown age (Brown and Chapman 1991*b*). The most anterior premolar is named the second premolar because during evolution the first premolar has been lost (Riney 1951).

A hind that died many years after tagging and collection of specimens had ceased was a special interest. She had become known as the Old Lady of Richmond Park and featured in an illustrated article which discussed the few known examples of longevity in red deer (Brown 1996). She bore her last calf at the age of sixteen. Tagged in 1969 she survived until found dead at the great age of twenty-seven years and six months. Her teeth were well-worn but all were present. The skeleton exhibited pathological conditions including periodontal disease, spondylosis of vertebral bodies, changes at and around articular surfaces of some vertebrae, healed rib fractures, remodelling around the elbow joints and deposits of new bone on some digits. Apart from general wear, tear and ageing, the cumulative effects of repeated pregnancies, lactations and occasional traumatic injuries would have contributed to these conditions. In general there was remarkable absence of limb joint disease for such an aged deer (Chapman and Whitwell 1998).

To determine the constituents of red deer serum, blood samples were taken from forty-nine deer of which seventeen were tagged and the ages of the others were assessed from tooth eruption/wear. The concentrations of some constituents changed with age (Kent et al. 1980).

Weights of calves

During three winter culls the deer dressers kindly weighed the whole bodies of some calves, some of which were tagged, using a spring balance which registered Imperial weights, subsequently converted to kilograms (Table 3). The mean weights of this sample do not necessarily represent the means across the whole calf cohort because at the cull the priority was to select any hinds and calves which appeared unthrifty or showed any sign of an injury. If the hind was to be taken the calf also was shot. Few of the deer were ‘poor doers’; so most deer culled were in good condition.

TABLE 3. Whole body weights (kg) of calves when culled.

	Males			**Females**		
Dates	n	Mean	Range	n	Mean	Range
25 Nov. 1968 – 6 Jan. 1969	13	52.8	39.5–63	9	47.2	35–58
24 Nov. – 31 Dec. 1969	12	62.7	50–73	8	54.1	40–68
7–16 Dec. 1970	6	55.0	45–65	2	55.5	53–58

TABLE 4. Weights (kg) from birth to death of eight tagged calves.

Tag no.	**Wt when tagged**	**Date when tagged**	**Wt when culled**
202	6.8	10 June 1969	55
195	8.2	7 June 1969	63
44	8.4	27 May 1968	59
171	8.4	31 May 1969	68
197	9.1	8 June 1969	65
194	9.3	7 June 1969	71
282	9.5	13 June 1970	56
180	>11.3	7 June 1969	73

All except tag no. 171 were males. All were shot during the period 24 November to 31 December in their year of birth.

For eight of these calves the weight when they were tagged was available. Five were newly born, two were recorded as active and the heaviest as very active. The data are too sparse to draw any conclusion on any correlation between birth weight and weight gain in the first six months. Many factors, especially the quality and availability of forage for the dam, and weather conditions, could influence the growth rate. Most calves had increased their weight seven to eightfold (Table 4).

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Masting in oaks *Quercus robur* in north London — observations on acorns collected during the mast year 2011, followed by the abundant establishment of seedlings in 2012

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Abstract

A total of 988 acorns collected from oak trees (mainly English oak *Quercus robur,* definitely not *Q. petraea,* but possibly including hybrids) were gathered at six sites in north London during the mast year of 2011, and were kept in a damp sand/compost mix in open trays so that their germination could be observed. 707 (72 per cent) of the acorns germinated within eight weeks of collection, a further 42 (4 per cent) by December 2011, while a further 93 (9 per cent) germinated between a cold spell in late January 2012 and July 2012. In total 842 (85 per cent) germinated successfully by July 2012, 134 (4 per cent) including 23 from which weevil larvae had emerged, were rotted, leaving 12 acorns still alive but not germinated.

Observations made in Queen's Wood, London Borough of Haringey (TQ288886) the following summer (2012) showed that very large numbers of acorns had germinated successfully, and the seedlings grown to budding/leafing stage. From counts made the total number of seedlings in the wood was estimated at around one million. It is suggested that the role of masting in oak may have other evolutionary explanations apart from the relationship of the tree with seed predators, and that recruitment of oaks may depend on massive but very infrequent events.

Introduction

Like numerous other woody plants (in Britain beech and hazel, elsewhere many other trees including many tropical trees) which produce large, non-fleshy fruits, oaks are masting trees which produce very large numbers of fruits on an irregular basis. Masting has been explained as having evolved from natural irregularities due to varying weather conditions in different years. Depending largely on the temperature in late summer, varying numbers of flower buds are established which grow the following spring. During a cool summer few flower buds develop and the acorn crop in the following year is small or even non-existent. When the late summer temperature is higher, large numbers of flower buds develop, and (except when the flowers are damaged by late spring frosts) these produce the mast crop. In extreme cases masting trees such as tropical bamboos (whose fruits have a wide range of predators from jungle fowl to rhinoceros), individual species are genetically programmed to flower simultaneously at intervals of many years (Janzen 1976).

The traditional interpretation of the masting phenomenon by biologists is that while normal fruit production is compromised by the attacks of seed predators, by concentrating the crop irregularly the tree benefits by overwhelming the predators in mast years. It is claimed that this evolved because it results in a greater chance of successful seed survival, subsequent germination and seedling establishment.

The main (wild) seed predators of acorns in British woodlands today are mice *Apodemus sylvaticus*, jays *Garrulus glandarius*, wood pigeons *Columba palumbus* and (introduced) grey squirrels *Sciurus carolinensis*. Several species of deer may be acorn predators outside peri-urban areas, while historically wild boar *Sus scrofa* would have been another important predator. There is also predation by weevils such as the common acorn weevil *Curculio glandium*. In the fragments of ancient woodland in north London such as Queen's Wood, Coldfall Wood (London Borough of Haringey) and Big Wood (London Borough of Barnet Hampstead), acorns are predated on by all the first four, as well as carrion crows *Corvus corone*.

It is also well known that acorns are what is termed recalcitrant seeds. They tend to commence germination within a few weeks of leaving the tree and are very difficult to store successfully. Acorns are collected and cached by both mice and jays which are regarded as the two of the main distribution agents (possibly with some contribution from wild boar (Den Outen et al. 2005)). Together they are thought to have been largely responsible for the spread of native oaks, *Quercus robur* and *Q. petraea*, across Britain between about 9,000 and 8,000 years ago, after the melting of the ice-sheet. This assumption presupposes that at least some of the acorns collected by mice and jays are subsequently not consumed. Popular belief has it that neither mice nor jays can find all the acorns they have hidden. The early germination (with its internal chemical changes) of acorns could be an adaptation to being cached by predators; by starting to germinate quickly they may become unpalatable by the time the mouse or jay finds them. Apparently mice and jays do act very well as dispersal agents. The pollen record suggests that the time taken for the spread of oak across these islands after the retreat of the ice-sheet was comparable to the much earlier spread of birch, whose tiny seeds are blown by the wind (Birks 1989; see also maps in Milner 2011).

In September 2010 the author collected twenty acorns (all thought to be *Q. robur*) from Queen's Wood and kept them to raise as seedlings. Fourteen (70 per cent) germinated within a few weeks. The remainder did not, although they appeared to be still alive. They were left in damp paper over the winter in an unheated greenhouse. There was a period of sub-zero temperatures in late January 2011 and the first week of February but on 12 February, about a week after a mild period began, the last six acorns all began to germinate, suggesting that they had been dormant and that the cold weather had broken this dormancy. This characteristic of some acorns is well known (Jones 1959) but has apparently been little studied.

When it became clear that 2011 was going to be a mast year, the writer began to collect ripe acorns to investigate the survival rates of acorns excluding the attentions of seed predators, starting at Queen's Wood (see Materials and methods). Of particular interest was the recalcitrant behaviour of acorns and it was hoped that careful observation under controlled conditions could answer a series of questions. What proportion of acorns germinated in the first few weeks? How many would remain to germinate after cold treatment? Was there any difference in the viability of acorns of different sizes? Would larger acorns (containing a larger food-store) exhibit a higher viability (even though, as might be assumed, larger acorns would be more attractive to predators)? Would small acorns germinate sooner on account of their smaller food store and the need to begin photosynthesis as early as possible? The methods used for this controlled observation of acorns are given below.

Following the study of acorns under controlled conditions, the natural germination, or rather the survival of the seedlings arising from the 2011 mast crop, was observed *in situ* at Queen's Wood and Coldfall Wood in July 2012. At Queen's Wood counts were made using a 10 cm × 10 cm quadrat, to estimate numbers in different parts of the wood.

Materials and methods

Between 14 August and 28 September 2011, 988 ripe acorns were collected in batches from what were all taken to be native oak trees *Q. robur* in north London. (Some collections of acorns from identifiably sessile oaks *Q. petraea* were made but the results of observing those acorns are not reported here.) The sites were: Queen's Wood (TQ288886), Coldfall Wood (TQ278903), Big Wood (TQ254890), Crouch End (TQ305883), Shepherd's Hill Park (TQ294884) and Moat Mount (TQ211941). Ripe acorns within reach were collected (if they did not fall into the hand easily they were not taken) and branches were shaken and only those falling were collected.

The acorns were kept in batches of approximately the same size; small (<3 gms average weight), medium (3–4 gms average weight) and large (>4 gms average weight), although the numbers in each batch varied considerably. Where a tree was producing acorns of different sizes these were put in different weight batches. The grouping was done by eye; each batch contained acorns of a similar size, and the batch was then weighed. Again, this was not precise as the moisture content could have varied, and without damaging the acorns this could not be standardized. Details of the batches are given in Table 1 columns A–E.

The acorns were kept in damp sand/potting compost in wooden trays in an unheated garage (with natural light — similar to that inside a wood), and checked weekly. Those that had started to germinate were removed and planted in John Innes No. 1 compost with some added sand. The remaining live but 'ungerminated' acorns in each batch were divided into two groups; one group stayed in the trays, and one group was placed in plastic bags (to retain moisture) and stored in a domestic fridge at or about 0°C. This was done to ensure they were subjected to a period of winter cold, in case 2011/12 was not a severe winter. In fact there was a period of very cold weather in January and February, so that effectively both lots of acorns were subjected to a period of more than two weeks at or below freezing. All the acorns were inspected when the outside temperature rose in mid February, in April and again in July 2012; many of those in bags in the fridge germinated so the results from each batch were reaggregated ('fridge' acorns and 'tray' acorns). By May 2012 many of the planted acorns had begun to produce shoots; by late June the trays were carpeted with young oak seedlings.

In July 2012 visits were made to Queen's Wood to count oak seedlings. Visits earlier in 2012 had established that in some places there were many oak seedlings and that elsewhere in the wood as a whole there were seedlings in considerable numbers. This is most unusual; the writer has been visiting the wood every month for the last twenty-three years to empty pitfall traps for spiders, and this is the first year in which more than just a few oak seedlings have been seen. In nearby Coldfall Wood good numbers of seedlings have been seen following some mast years although very few have survived (D. Bevan, pers. comm.).

TABLE 1. Fate of 988 acorns up to December, from 14 samples grouped by size.

Batches: S= small <3gm; M = medium = 3-4gm; L =large >4gm.

Sites: QW = Queen's Wood, CE = Crouch End, SH= Shepherd's Hill Park, MM = Moat Mount, BW = Big Wood, Hampstead, CW= Coldfall Wood.

A = batch, **B** = date of collection, **C** = no. of acorns in batch, **D** = size group, **E** = average weight, **F** = No. germinated in first eight weeks from collection date, **G** = germinated after eight weeks and before January 2012, **H** = germinated January – July 2012, **I** = total number germinated, **J** = no. of acorns rotted (including those from which weevil larvae had emerged), **K** = weevil larvae emerged, **L** = still alive, not germinated by July 2012. Fate of each batch is total of columns I, J and L.

A	Site	B	C	D	E	F [ ] =%	G	H	I [ ]=%	J	K [ ]=%	L
A	QW	14/8	67	S	1.9 gm	44 [66]	—	1	45 [67]	21	12[18]	1
D	CE	14/8	79	S	2.0 gm	30 [38]	—	5	35 [44]	44	—	
L	BW	24/8	120	S	1.9 gm	110 [92]	3	3	116 [97]	4	2 [2]	
O	QW	25/8	25	S	2.5 gm	25 [100]	—	—	25 [100]	—	—	
X	SH	27/9	68	S	2.2 gm	54 [79]	3	9	66 [97]	2	—	
		Total	**359**			**263 [73]**	**6**	**18 [5]**	**287 [80]**	**71**	**14**	**1**
C	QW	14/8	195	M	3.5 gm	102 [52]	21	33	156 [80]	31	—	8
U	MM	28/8	58	M	3.6 gm	31 [53]	—	10	41 [71]	15	—	2
M	BW	25/8	35	M	3.5 gm	29 [83]	1	1	31 [89]	4	—	
Q	QW	28/8	102	M	3.6 gm	89 [87]	5	7	101 [99]	1	—	
V	MM	22/9	39	M	3.9 gm	33 [85]	3	3	39 [100]	—	—	
		Total	**429**			**284 [66]**	**30**	**54[12.6]**	**368 [86]**	**51**	**—**	**10**
R	QW	2/9	91	L	4.8 gm	63 [69]	4	16	83[91]	8	8 [9]	
H	QW	19/8	10	L	4.1 gm	6 [60]	—	1	7 [70]	3	—	
T	MM	22/9	49	L	5.2 gm	45 [92]	1	3	49[100]	—	—	
Y	CW	27/9	50	L	6.2 gm	46 [92]	1	1	48 [96]	1	1[2]	1
		Total	**200**			**160 [80]**	**6**	**21[10.5]**	**187[94]**	**12**	**9**	**1**
		Total	**988**			**707 [72]**	**42[4]**	**93 [9]**	**842 [85]**	**134[14]**	**(23 [2])**	**12**

Results

Results of the acorn germination experiments between August 2011 and July 2012, and the seedling counts in July 2012 are given in Tables 1–3.

Table 1 shows results of germination up to the end of the first eight weeks (column F), and between eight weeks and eleven months (column G), and in total (column H). Altogether, 707 (72 per cent) acorns had germinated in the first eight weeks' collection, 749 (76 per cent) by the end of December, and a total of 842 (85 per cent) by July 2012. A further 142 (14 per cent) were apparently not viable; they failed to germinate and had rotted. This included a total of 23 (2.3 per cent) from which weevil larvae (probably all *Curculio glandium*) had emerged.

There was considerable variation both after eight weeks and in total. Germination after the first eight weeks varied from 35 per cent to 100 per cent in different batches (Table 1). When grouped by size, germination success at this stage varied from 66 per cent (medium) to 80 per cent (large) with small acorns at 73 per cent being exactly half way between. In some batches significant numbers of acorns were found to have rotted although conditions in the trays were kept as similar as possible. Infection by weevils was low but varied from 0 to 18 per cent (Table 1, column K).

At eight weeks, considerable numbers of acorns in each group remained alive but 'ungerminated'. A further 42 germinated by the beginning of December (in particular 21 from batch C), but the remaining acorns (>100) were alive but showed no sign of germinating. At that stage it was not clear what the fate of these acorns would be. Column H shows that 93 germinated after the sub-zero temperatures of late January and early February, small numbers not germinating until well into spring of 2012. By July just 12 acorns (0.1 per cent of the original total) remained ungerminated and still apparently viable, i.e., they had not rotted.

When the batches are grouped by size of acorn (Column I) the total numbers successfully germinating were as follows: 80 per cent of the small acorns, 86 per cent of the medium-sized acorns and 94 per cent of the larger acorns.

These results coincide with general scientific opinion; most acorns are known to germinate soon after falling. The germination of some acorns after cold treatment is interpreted as meaning that these individuals had a dormancy (presumably determined genetically) which required the cold conditions to break. Gosling (2007) refers to a 'shallow dormancy' in acorns and admits that they are virtually 'impossible to store. They cannot be frozen and are therefore highly perishable.'

When the batches are grouped according to date of collection a different pattern emerges (Table 2). Two of the earliest batches collected (A and D both collected 14 August 2011) showed the lowest total germination: 67 per cent and 44 per cent. Apart from these, the total germination was between 70 per cent and 100 per cent for all samples, but there was considerable variation in the dates when germination took place. In batch C one third of the acorns germinated after the first eight weeks; nearly 15 per cent of them only after cold treatment. This batch also has the largest number of ungerminated individuals at the time of writing.

TABLE 2. Germination of acorns grouped by date of collection.

A	B	C	F	G
Batch	**Date of coll.**	**No. of acorns**	**Total no. germinated**	**Percentage germinated**
A,C,H,D	14/8 to 19/8	351	243	69%
L,O,U,M,Q,R	25/8 to 2/9	431	397	92%
T,V,X,Y	22/9 to 27/9	206	202	98%
	Grand total	**988**	**842**	**71%**

As a group the larger acorns demonstrated marginally the highest viability, and also the highest number of post-dormancy germinations (9.5 per cent of the total compared with 2.8 per cent of medium size, and 5 per cent of small size).

Observations in Queen's Wood in 2012

In the summer of 2012 the author noticed extraordinarily large numbers of oak seedlings in some parts of Queen's Wood, under or adjacent to individual mature trees. In mid July 2012 counts were made using a 10 × 10 cm quadrat (the large number of seedlings was difficult to cope with using a standard quadrat so a smaller one was used). The results are shown in Table 3 and in Figures 1 and 2. The seedlings occurred widely in the wood, but their distribution was very patchy. There were large 'shoals' in some places, especially along the road edge of the wood, where they are extremely densely packed, reaching around 1,000 per sq. m. Other shoals were less dense but still well over 100 per sq. m. (some under dense hornbeam canopy, others in grassy glades). In other areas, mostly well shaded, there was a lower but more or less continuous density of 0–20 (–50) per sq. m., while in much of the wood there were only low numbers or none at all. From the estimated figures in Table 3 a possible total of over one million oak seedlings in the wood as a whole cannot be discounted.

The counting sites have been noted and are marked on the map (Figure 3), so that their survival can be observed in future years.

TABLE 3. Counts of oak seedlings in selected 'shoals' at Queen's Wood, 12 July 2012 (see map).

'Shoal'	Distance from road	No. of 10-cm square quadrats	Mean no. per sq. m.	Est. area of seedling 'shoal'	Estimated no. of seedlings in the 'shoal'
A road edge S side (1)	1 m	30	210	30 sq m	6,300
B road edge S side (2)	1 m	10	950	135 sq m	128,250
C under canopy S side	15 m	40	365	225 sq m	82,125
D Road edge N side	1 m	10	740	30 sq m	22,200
E under canopy N side	70 m	50	27	40 sq m	1,080
F grassy clearing N side	80 m	80	59	20 sq m	1,180
G semi-shade N side	75 m	70	129	10 sq m	1,290
					Total: 242,425

Discussion

The variability in behaviour of acorns between different batches, and the variation within the batches suggests that there is considerable genetic diversity between the trees sampled. Individual trees produce acorns of different sizes but these observations have shown that the different sizes have similar viability, and that this viability is high. It must be assumed that the production of acorns of many sizes by individual trees is in itself of selective advantage. Since (in mast years) such vast numbers are produced resulting in such small numbers of mature trees — the whole of Queen's Wood has perhaps not more than 500

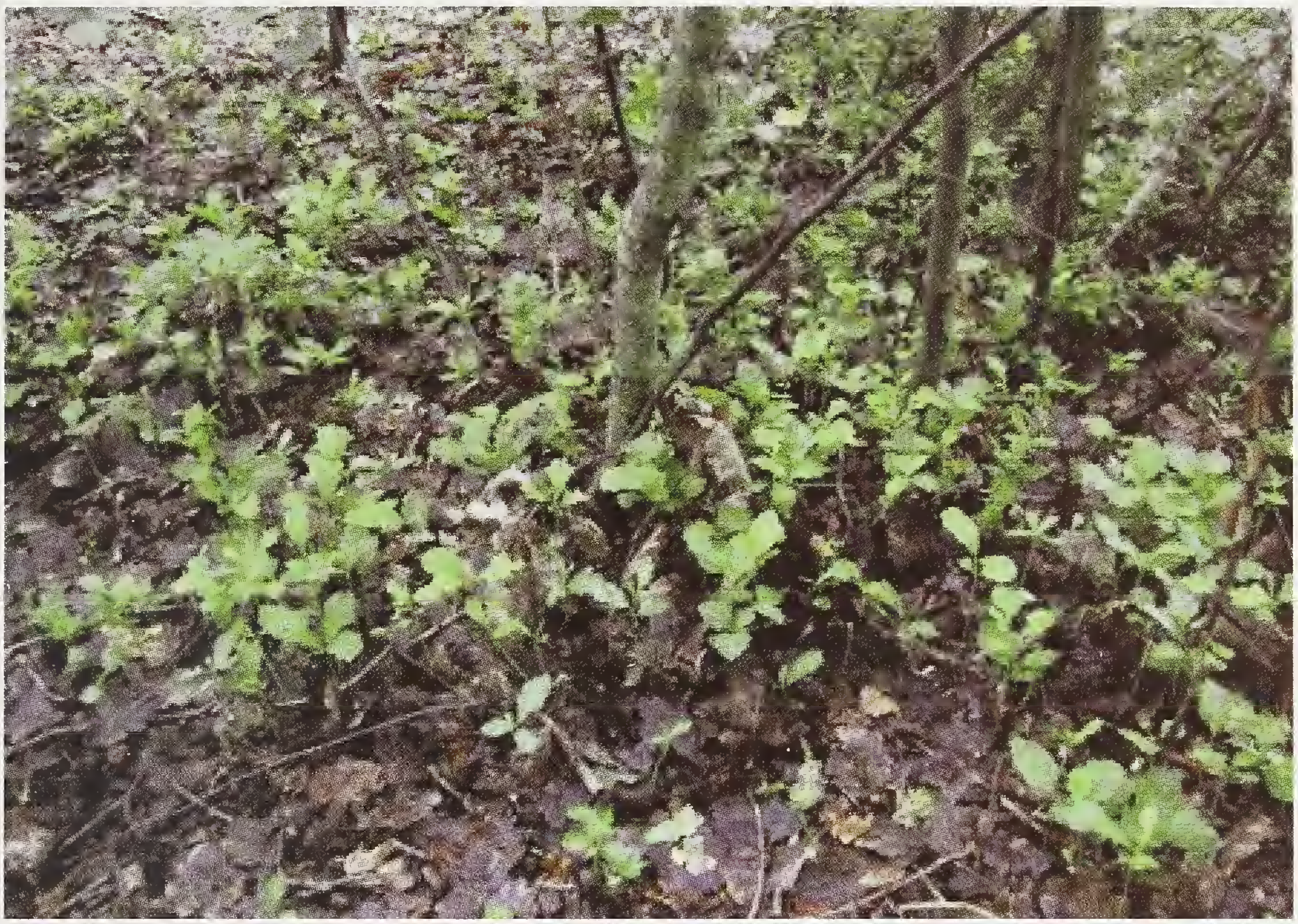

FIGURE 1. Oak seedlings under dense hornbeam shade in Queen's Wood (shoal A).

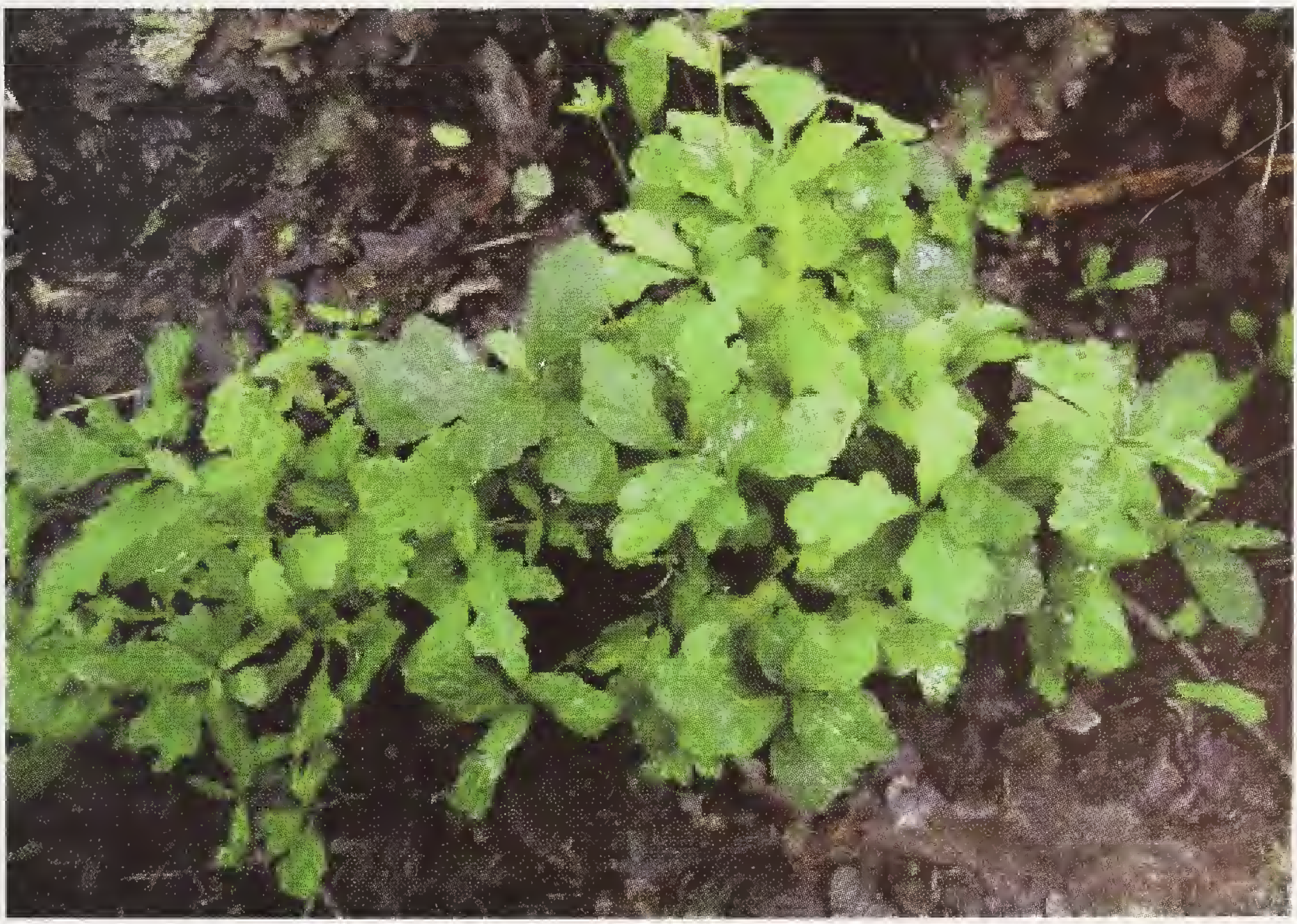

FIGURE 2. Close-up showing densely packed oak seedlings (shoal G).

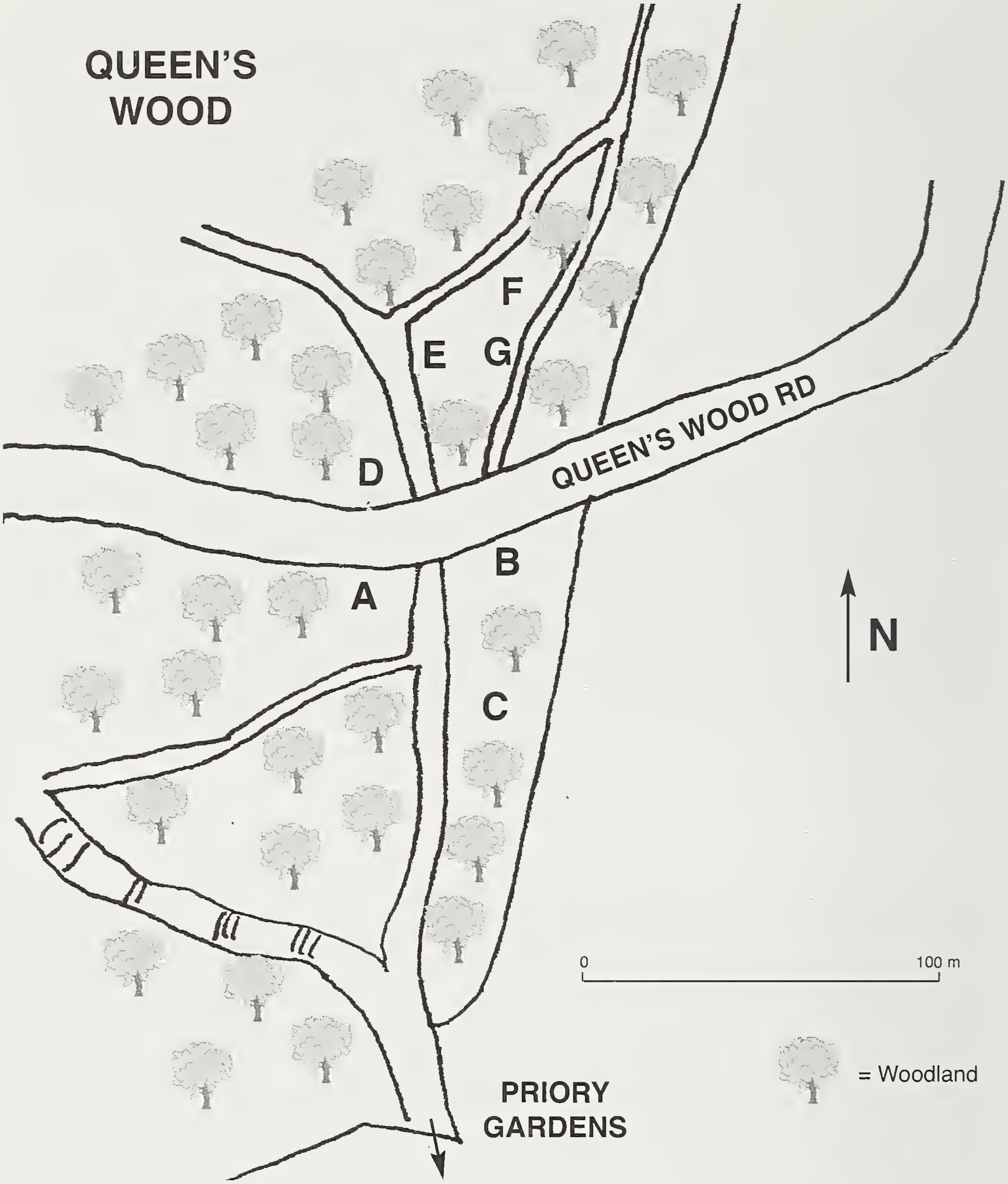

FIGURE 3. Map showing 'Shoals' A–G.

mature oaks — and very few saplings, any small selective advantage would surely have had an effect by now. In fact the age range of oaks in the wood is very irregular: most mature oaks appear to be of a few cohorts of similar ages of between 100 and 200 years. There are very few younger trees but a small number of ten-to-twenty-year-old saplings and (until 2012) just a few young saplings/seedlings under ten years. The relative absence of young trees has led to the popularly held belief that oak is failing to regenerate in north London woodlands.

While it is not possible to know what proportion of acorns from the 2011 mast crop were taken by predators, it is clear from the counts made in 2012 that a very large number of acorns survived predation. Most of the seedlings counted would have germinated in the autumn of 2011, and only put out their shoots in the early summer of 2012. As the spring and summer of 2012 were unusually damp and cool, few if any of the seedlings can have died of water stress, although in July 2012 many of those which had successfully reached the stage of producing their first pairs of leaves were infected with oak mildew *Microsphaera alphitoides* inevitably weakening many, and survival of the vast majority is unlikely. In view of the prevalence of this fungus (which appears to have been largely responsible for the failure of oak seedlings at Coldfall Wood in recent years (David Bevan, pers. comm.)) any genetic resistance to its effects would surely offer a major advantage.

Why this phenomenon of massive germination and subsequent seedling growth has not occurred in any of the previous twenty-three years in Queen's Wood remains a mystery. After past mast years there has been the establishment of small numbers of seedlings, but from the writer's observations these have been nothing to compare with the 2012 shoals.

While most researchers have concentrated on the relationship between masting trees and their predators (e.g. Silvertown 1980, Crawley and Long 1995) reflection on these experiments and observations suggests that masting (at least in Queen's Wood in 2011) was so successful as to render the role of predators irrelevant. Squirrels, mice, woodpigeons and jays are all present, as they have been for at least the past two decades; there is no reason to suspect that fewer than normal acorns were destroyed by these predators (although larger numbers may be predated by weevils in other years). The number of acorns produced was clearly far more than the predators could deal with. What is the meaning of this vast excess?

I suggest the following: in non-mast years any acorns that survive predation do so purely by chance, and in such small numbers that natural selection can hardly operate, and certainly not act on fine differences in the competitive characteristics of individual seedlings. In non-mast years there are too few of them for there to be any real competition. Chance will play a large part in which individuals survive and if this process is repeated over several years genetic drift may occur, so that the young seedlings and saplings may not be those best suited to the environment, and this may affect their long-term survivability.

What the process of vast over-production does is ensure that competitive selection operates very strongly; only one or two individuals can possibly succeed out of entire shoals — an estimated 1:128,250 at shoal B for example. Wherever the shoals occur only the genetically best-suited individuals will survive; virtually one in a million. This should result in the genotypes succeeding which, at least as saplings, are best suited to minute differences in the environment in different parts of the wood — for example slope and aspect, soil pH, microclimate, etc. Masting allows 'all bases to be covered'.

Viewed in this light, perhaps it has nothing to do with predators at all?

The significance of the observations made also raises the question; how important are very infrequent major events in biological systems? The mass seedling establishment of oak in the damp summer following the mast year of 2011 may only occur once in several decades, but that may be quite sufficient to maintain the structure and composition of the wood. Looking at the mature oaks in the wood today, most appear similar in size and age and may represent just a few cohorts originating in occasional successful years for seedling establishment following mast years, decades apart. Bevan (1986) has estimated the age of oaks at nearby Coldfall Wood by calibrating from the ring count of a single oak dated to 1800. After measuring the circumference at breast height of all the mature oaks standing today in Coldfall Wood he concluded that they represent just four cohorts dating from 1800, 1860, 1890 and 1930. Preliminary counts suggest that a similar pattern occurs in Queen's Wood.

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London butterfly monitoring report for 2011

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Abstract

Data from twenty-seven sites in London, monitored using the transect walks method, were used to calculate collated indices for 2011 and to enable comparisons with previous years. Species accounts were supplemented by records from other sites, surveys and observations.

Introduction

Monitoring of butterflies was undertaken by a standard method at sites in London in 2011. These provided data for the calculation of collated indices of changes in the abundance of butterfly species in London as compared with previous years. London is defined for the purposes of this paper as Greater London or the area encompassed by the London boroughs. Additional records from the wider London Natural History Society (LNHS) recording area were noted and/or made available to other regional and national recording systems.

Methods

Monitoring was undertaken by the transect walk method, a standard method adopted throughout the United Kingdom. Details of the method are described elsewhere: see Pollard and Yates (1993), Williams (2000), and the UK Butterfly Monitoring Scheme at www.ukbms.org. Basically, at each site a walk was undertaken along the same route, each week between April and September inclusive, within a standard range of weather conditions conducive to butterfly flight. Counts were made of the number of adult butterflies observed to provide a total for each species for the year at each transect. Totals used for this paper include calculated estimates for weeks missed due to poor weather or the unavailability of the recorders. However, for inclusion in the index, data from each transect required good coverage during the recording season and with the minimum of missed weeks. To contribute to the indices, data from each transect must be available for at least two years, though these do not need to be consecutive. Collated indices were calculated from the data as described by Williams (2000), but see Crawford (1991) for an introduction to the use of collated indices in wildlife monitoring; and also Pollard and Yates (1993). Note that neither the original site counts nor the collated indices are absolute counts of the population, but indices of abundance for each species. Estimates of the relative changes in the populations of each species from year to year are given by the difference in the indices. For example, a species with an index of 50 in one year and 25 in the following year would have had approximately half the adult population in the second year as compared with the first year. Indices have been rounded to the nearest whole number and were generally set at 100 in 1990 or the first year of record of a species: for a technical discussion see

Crawford (1991). Reliability of indices increases with the number of transects; in the earlier years these were relatively few, e.g. one transect was walked in 1978, two in 1986, three in 1988 and eight in 1990. Reliability of the indices may be lower for species with low counts and/or local distribution in London. The 'Total count on transects' provides an indication of the size of the count from which the analysis was made in 2011 using the data from the complete transects for that species, including estimated counts for missing weeks, but excluding the computed estimated counts for transects that were not walked or of transects that had insufficient data in 2011.

Transects that contributed data in 2011, the years for which data were available and the borough in which the transect was located were: **Hampstead Heath** (Camden) 1978–2011, **Fryent Country Park** (Brent) 1986–2011, **Beane Hill** (Brent) 1988–2011, three transects managed by the Corporation of London (located in the London Borough of Croydon): **Coulsdon Common** 1990–2011, **Farthing Downs** 1990–2011, **Riddlesdown** 1990–2011; **Mitcham Common 'route A'** (Merton) 1994–2001, 2003–2011, **Mitcham Common 'route B'** (Merton) 1995–2011, **Wildfowl and Wetlands Trust Wetland Centre at Barn Elms** (Richmond upon Thames) 1996–2011, **Railway Fields** (Haringey) 1997–2011, **Hutchinson's Bank Nature Reserve** (Croydon) (Figure 1) 1997–2011, **Cranford Park** (Hounslow) 1997–2005, 2011, **South Norwood Country Park** (Croydon/Bromley) 1998–2011, **Tower Hamlets Cemetery Park** (Tower Hamlets) 1999–2011, **Gunnersbury Triangle** (Hounslow) 1999–2011, **Brent Reservoir** (Barnet/Brent) 2000–2011, **Regent's Canal towpath from Mile End Road to Mare Street** (Tower Hamlets/Hackney) 2001–2011, **Riddlesdown Quarry** (Croydon) 2001–2005, 2008–2011, **Kenwood Estate** (Camden) 2005–2011, **Horsenden Hill East** (Ealing) 2005–2011, **Horsenden Hill West** (Ealing) 2005–2011, **Perivale Wood** (Ealing) 2005–2011, **Farthing Downs New Hill** (Croydon) 2005–2011, **Spring Park** (Croydon/Bromley) 2001–2006, 2011, **Camley Street Nature Park** (Camden) 2009–2011, **Hounslow Heath B** (Hounslow) 2010–2011; and **Sydenham Hill Wood** (Southwark) 2010–2011. Recorders for 2011 are listed in the Acknowledgements. For some sites, the indices have been updated with data from earlier years that were not available previously.

Records from LNHS and other observations have been included in the species accounts where appropriate. Transects beyond Greater London but within the LNHS area are not included in these collated indices and reference should be made to the respective county data and reports produced by Butterfly Conservation (e.g., Wood 2012) and other teams. However, the species accounts here make reference to the wider area where appropriate.

The London transects contribute towards the national indices of the UK Butterfly Monitoring Scheme, and for results up to 2010 refer to Botham et al. (2011). Records also contribute towards the data held by Greenspace Information for Greater London (GiGL).

Results

The order and nomenclature of the species accounts follow Asher et al. 2001. The accounts are based on the collated indices which commenced in 1978, and which for the years 2001 to 2011 are presented in Table 1. As some year-to-year variations are to be expected the comments are focused on the more pronounced changes and on longer-term trends.

SMALL SKIPPER *Thymelicus sylvestris* and ESSEX SKIPPER *Thymelicus lineola*

Small and Essex skippers are accounted for together as they were generally counted together by transect walkers due to the difficulty of separately identifying the two species while they are in flight. Both species are dependent on rough grassland habitat, and whilst they are widespread there is evidence of a long-term decline in London. In 2011 the index, while slightly higher than in 2010, was the second lowest for over twenty years and probably since butterfly monitoring commenced in London in 1978. Records of at least one of the species were received from all but one transect site. There was a large increase on the Regent's Canal towpath from Mile End Road to Mare Street. At eleven of the London transects, recorders identified some of the individuals to species level; and of 148 skippers, 69 per cent (102) were small skippers and 31 per cent (46) were Essex skippers. The decline of these species in London is reflected in Hertfordshire and Middlesex (Wood 2012) and nationally (Botham et al. 2011). Total count on transects: 1,008.

LARGE SKIPPER *Ochlodes sylvanus*

As a species of rough grassland and scrub, the counts in London generally reflected the distribution of this habitat. While the index was the highest since 2003, the large skipper has declined in London compared with the 1980s to mid 1990s. Total count on transects: 489.

DINGY SKIPPER *Erynnis tages*

The typical habitat of the dingy skipper is of short grassland containing the larval food plants, with some bare patches and taller vegetation to provide shelter and roosting areas (Asher et al. 2001). In London it is effectively confined to chalk grassland sites on the southern edge of the area. The majority of the records were from Hutchinson's Bank Nature Reserve where numbers have increased for four successive years, as consequently has the London index. It was also recorded at three other sites. Total count on transects: 72.

GRIZZLED SKIPPER *Pyrgus malvae*

Habitat for the grizzled skipper is unimproved grasslands containing spring nectar plants and the larval food-plants, preferably with bare patches and taller vegetation (Asher et al. 2001). In London it is effectively confined to a few chalk grassland sites on the southern edge of London: in 2011 the transect records were all from one site, Hutchinson's Bank Nature Reserve where the count recovered to near that of 2009. Nationally, Botham et al. (2011) noted that it has declined significantly between 1976 and 2010. Total count on transects: 27.

CLOUDED YELLOW *Colias croceus*

One was recorded on 12 September 2011 at Perivale Wood by Peter Edwards, though not on a monitored transect walk. Total count on transects: 0.

BRIMSTONE *Gonepteryx rhamni*

The brimstone occurs in woodland edge and more-open habitats wherever the larval foodplants, particularly alder buckthorn *Frangula alnus* and on drier soils, common buckthorn *Rhamnus cathartica*, occur. Though they range widely in search of these, the situation contrasts with that of the 1980s, when the species was apparently absent from a large swathe of north London (Plant

TABLE 1. Collated indices for butterfly species in London, 2001–2011. Indices have been rounded to the nearest whole number and have usually been set at 100 in 1990 or the first year of record, though indices may be set at 100 in other years or at a different figure where this aids interpretation. A blank indicates that the species had not yet been recorded on any transect in London. A zero indicates that a species was not observed on transects in that year but had previously been observed on a transect in London.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Small and Essex skippers	86	72	72	76	78	74	61	60	63	33	39
Large skipper	35	61	85	57	63	49	45	28	65	54	70
Dingy skipper	40	70	104	69	56	26	14	15	30	39	80
Grizzled skipper	16	48	41	81	21	26	44	67	117	29	113
Clouded yellow	0	75	121	108	0	554	24	88	300	0	0
Brimstone	87	87	75	106	103	96	68	71	131	84	119
Large white	106	173	114	144	159	143	71	117	305	104	85
Small white	116	149	169	246	199	180	183	147	222	162	252
Green-veined white	60	96	73	96	65	57	50	49	95	48	89
Orange tip	62	78	43	63	75	51	35	39	78	76	112
Green hairstreak	137	199	79	114	71	44	102	77	83	61	239
Purple hairstreak	181	304	184	272	451	327	309	405	468	510	380
White-letter hairstreak	19	11	13	9	63	101	22	27	74	66	23
Small copper	6	6	58	51	21	56	48	31	49	47	41
Small blue	409	216	45	68	136	485	287	194	363	1,318	3,192
Brown argus	5	14	26	26	12	27	20	13	18	38	58
Common blue	40	50	143	63	53	114	33	40	89	128	53
Chalkhill blue	85	39	39	89	29	129	10	3	10	8	32
Holly blue	52	42	42	63	72	40	71	62	24	41	54
White admiral	0	0	0	100	0	0	0	100	0	100	300
Purple emperor					100	0	0	0	0	0	0
Red admiral	185	201	407	127	159	372	386	140	140	150	259
Painted lady	7	71	377	36	3	228	36	4	1,003	18	3
Small tortoiseshell	44	25	67	144	52	26	12	5	10	24	32
Large tortoiseshell									100	0	0
Peacock	1,054	636	382	583	507	313	397	313	850	624	282
Comma	149	134	205	151	125	230	117	118	307	142	103
Dark green fritillary	7	11	91	9	4	0	0	0	11	7	22
Silver-washed fritillary	95	0	0	0	125	500	0	0	125	758	867
Glanville fritillary											100
Speckled wood	147	204	231	140	148	131	123	189	237	131	166
Marbled white	14	17	35	24	12	35	33	54	59	36	46
Gatekeeper	132	127	161	204	243	196	155	150	184	167	166
Meadow brown	90	66	135	112	148	129	75	83	78	49	68
Ringlet	230	290	384	223	168	206	140	260	320	280	276
Small heath	1	1	9	7	10	10	11	7	9	13	42

1987). During the past two decades, alder buckthorn has been planted at numerous locations in north London with the aim of increasing the distribution and populations of the brimstone. More planting was undertaken in both the winters of 2010/11 and 2011/12 at Fryent Country Park; and also at Stonebridge, Brent, in early 2011 organized by Dawn Manning. Planting is effective in gardens too. Diane Andrews reports from Haringey where an alder buckthorn grown in a pot was visited by a female brimstone to lay eggs on 23 April 2011 (compared with 10 May 2008 and 24 May 2009). Of the seventeen eggs found, eleven caterpillars emerged and required some protection from potential predators, particularly great tits. Following chrysalis formation, ten brimstones emerged and took flight between 30 June and 3 July 2011. For London, the last record of an adult on the wing was on 13 November 2011 near to a maze constructed partly of alder buckthorn at TQ199873. Total count on transects: 718.

LARGE WHITE *Pieris brassicae*

The large white ranges widely but is particularly associated with locations where the larval food plants, species of *Brassica,* occur, and particularly in agricultural areas where *Brassica* field crops are grown, and in urban areas with gardens and allotments. Recorded on all transects in 2011, though the changes in abundance were variable. While there was a large reduction in numbers at the Hounslow Heath B transect, numbers increased at the majority of other transects. The net result was a slight reduction in the index; in contrast a larger reduction in abundance was noted in Hertfordshire (Wood 2012). Total count on transects: 626.

SMALL WHITE *Pieris rapae*

Associated with *Brassica* plants, the small white is noted for laying eggs on crops and garden plants. Recorded on all transects, though some transect records appear to include counts for the green-veined white. The index was slightly higher than in 2004 and the highest since 1997. The London results indicate a strong association with green spaces in urban areas, particularly at Tower Hamlets Cemetery Park, the two Mitcham Common transects, South Norwood Country Park, the Regent's Canal towpath and the London Wetland Centre, which together accounted for the large majority of transect records. Total count on transects: 2,851.

GREEN-VEINED WHITE *Pieris napi*

The green-veined white occurs widely and particularly in damp grassland, and alongside hedgerows, woodland, ditches, and water where wild crucifer food plants grow. Compared to 2010 there were large increases in numbers at several sites; sites with particularly high counts were Tower Hamlets Cemetery Park and Hounslow Heath B. Total count on transects: 1,941.

ORANGE TIP *Anthocharis cardamines* (Figure 2)

A species of damp meadows, hedgerows, woodlands, roadsides and waterside habitats where crucifer food plants occur, in particular cuckooflower *Cardamine pratensis* and garlic mustard *Alliaria petiolata.* Orange tips were recorded on all but two transects in 2011. Numbers were up at almost all sites and the index was the highest since 1992. Total count on transects: 689.

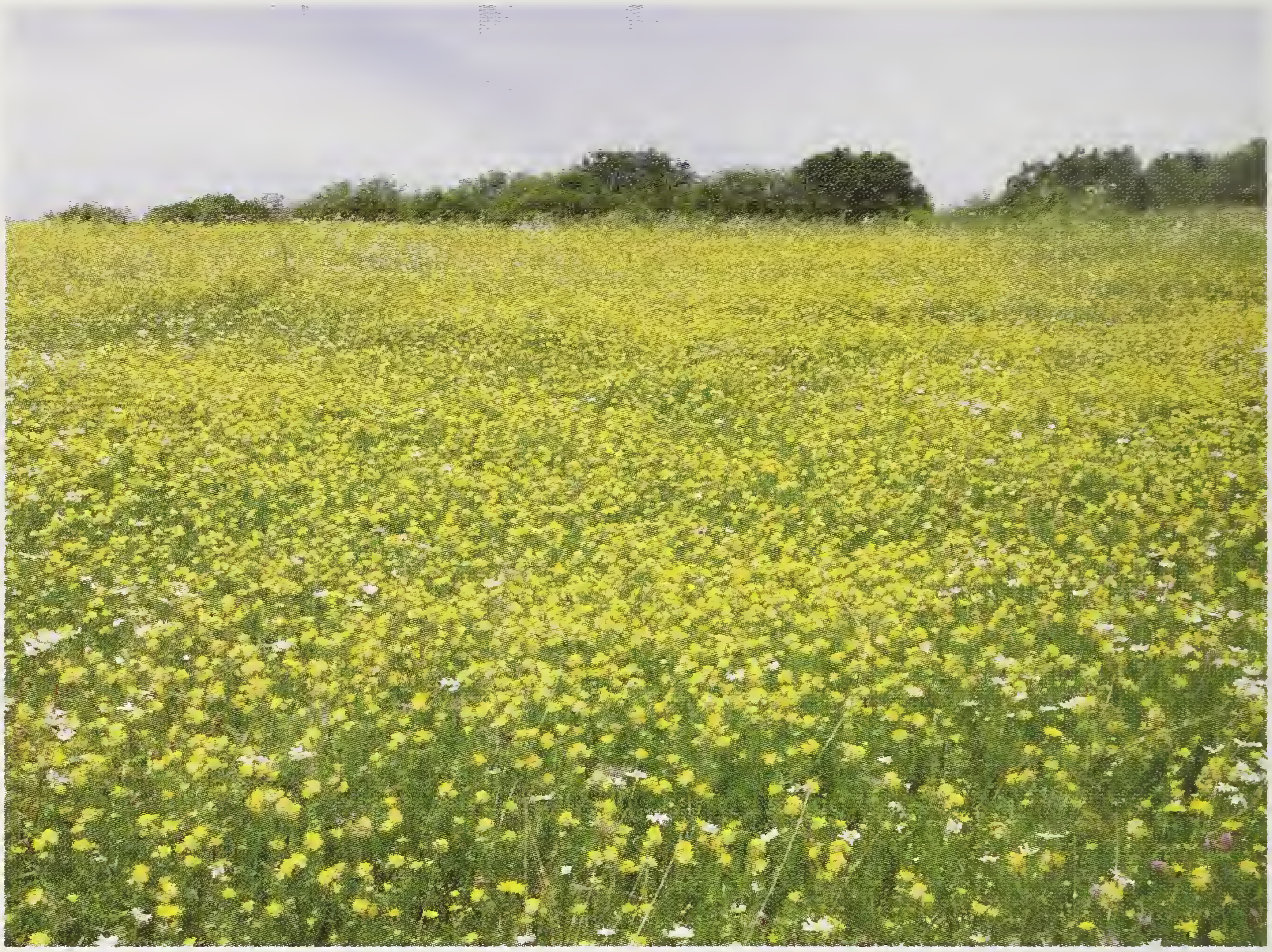

FIGURE 1. Field with kidney vetch *Anthyllis vulneraria* near to Hutchinson's Bank Nature Reserve; habitat of the small blue butterfly. *Photo: Martin Wills*

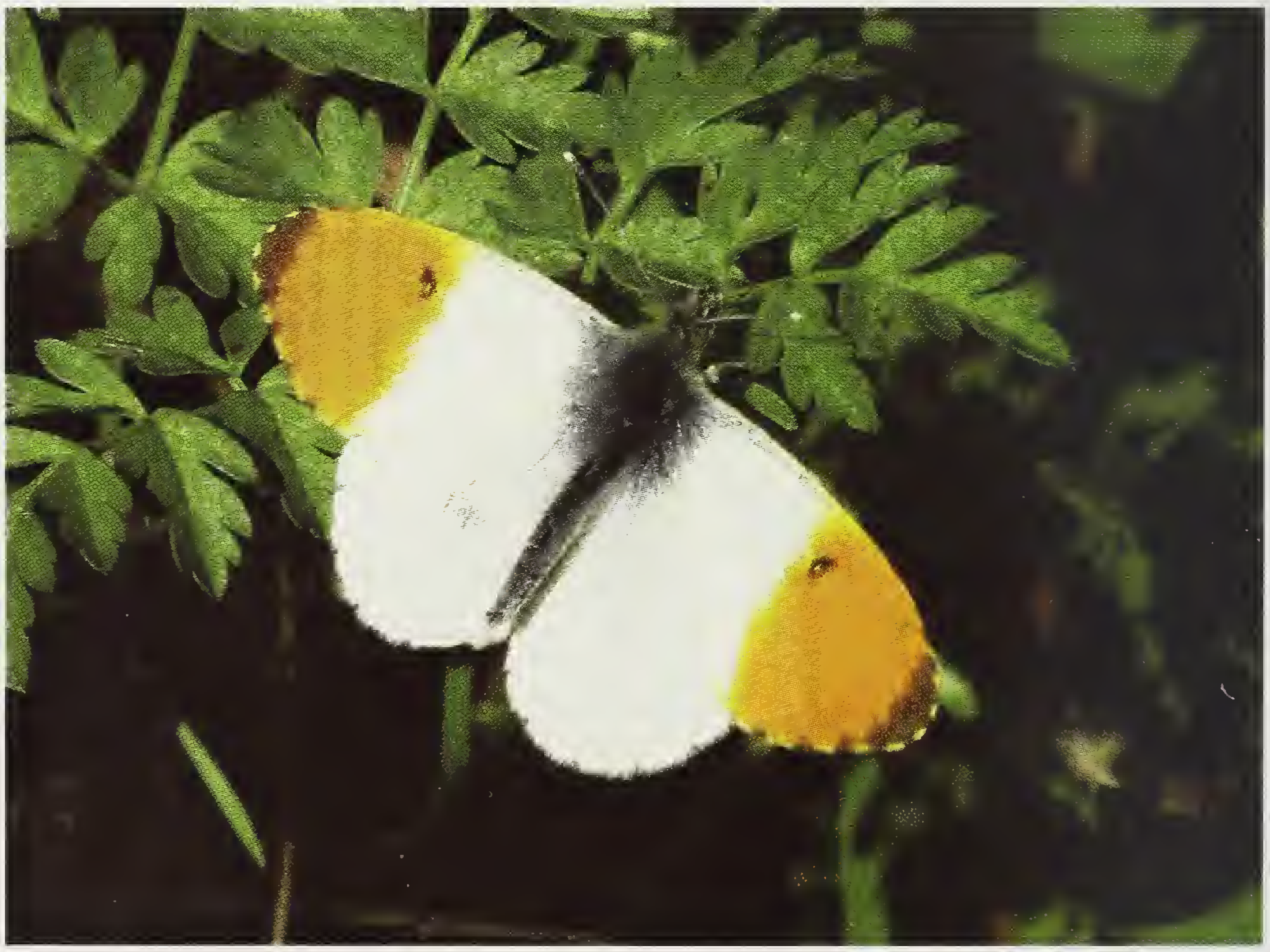

FIGURE 2. Male orange tip at London Wetland Centre, Barn Elms. ×*c*. 2. *Photo: Mike Caiden*

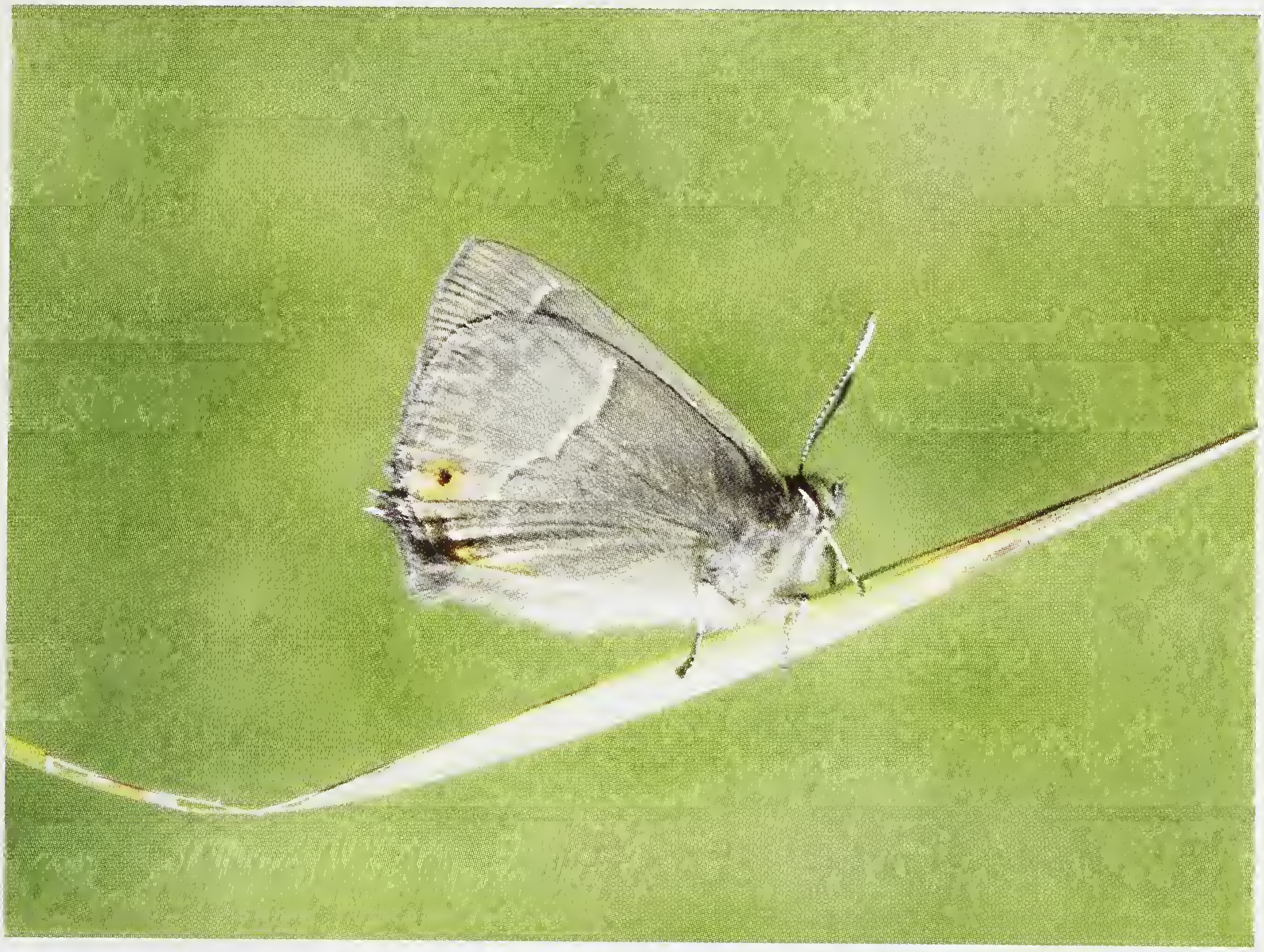

FIGURE 3. Purple hairstreak at the Brent Reservoir. ×*c*. 2. *Photo: Andrew Self*

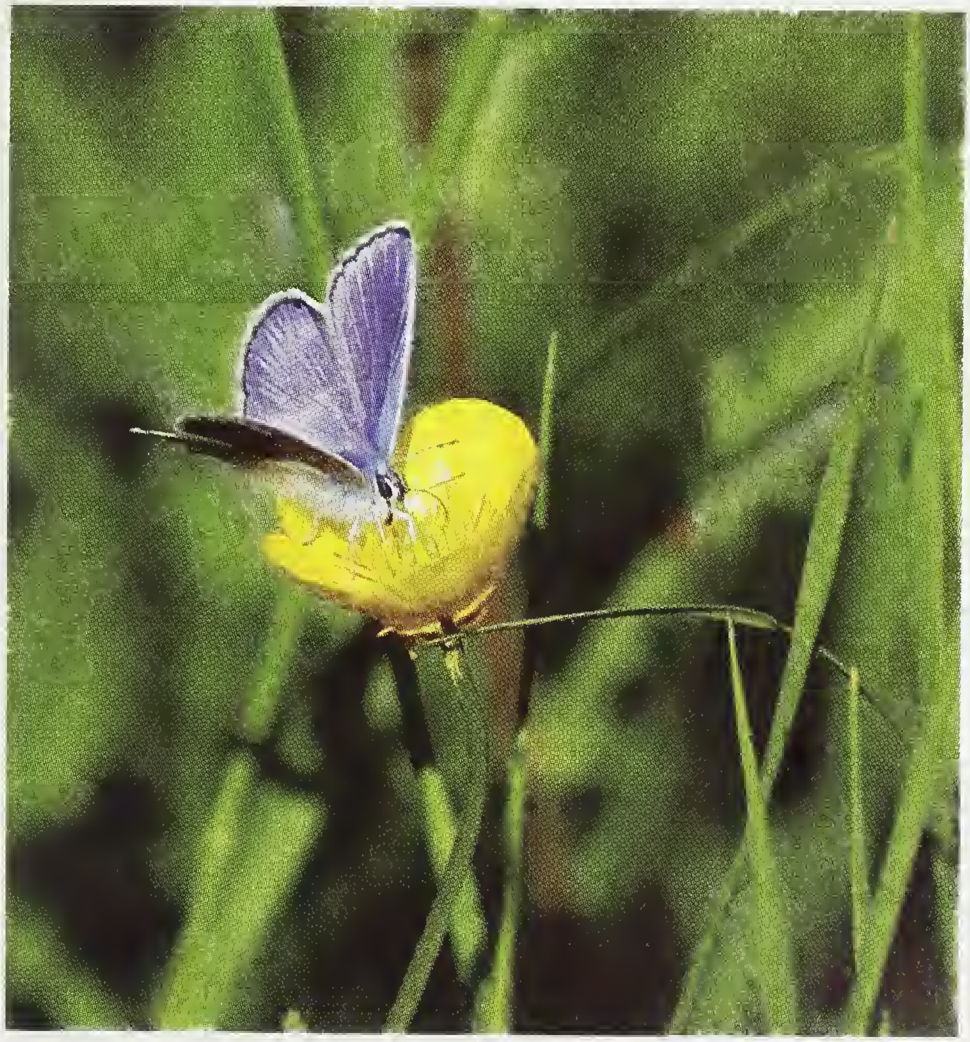

FIGURE 4. Common blue at London Wetland Centre, Barn Elms. ×*c*. 1.2.
Photo: Mike Caiden

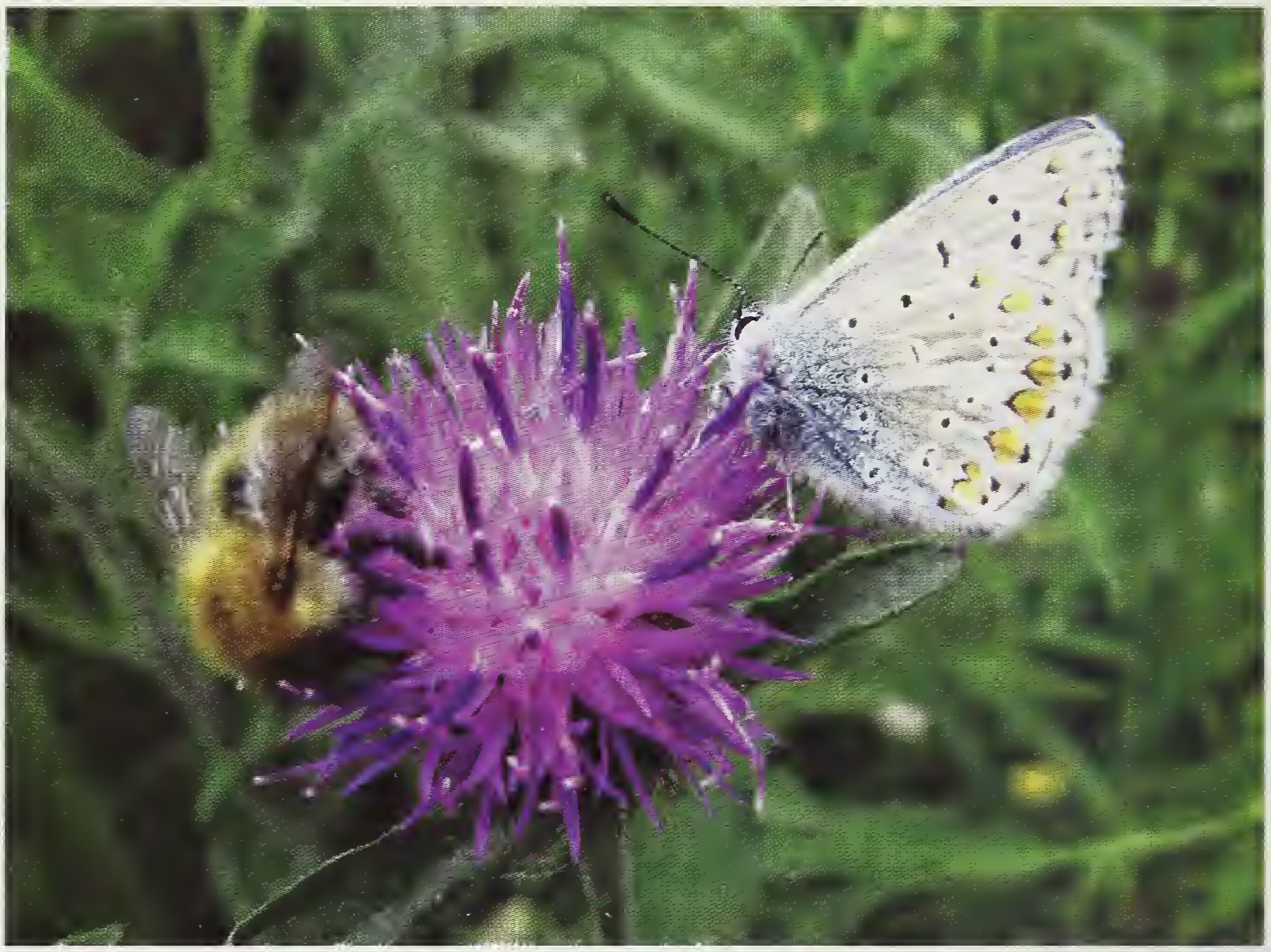

FIGURE 5. Common blue showing underside; at London Wetland Centre, Barn Elms. ×*c.* 2.3. *Photo: Mike Caiden*

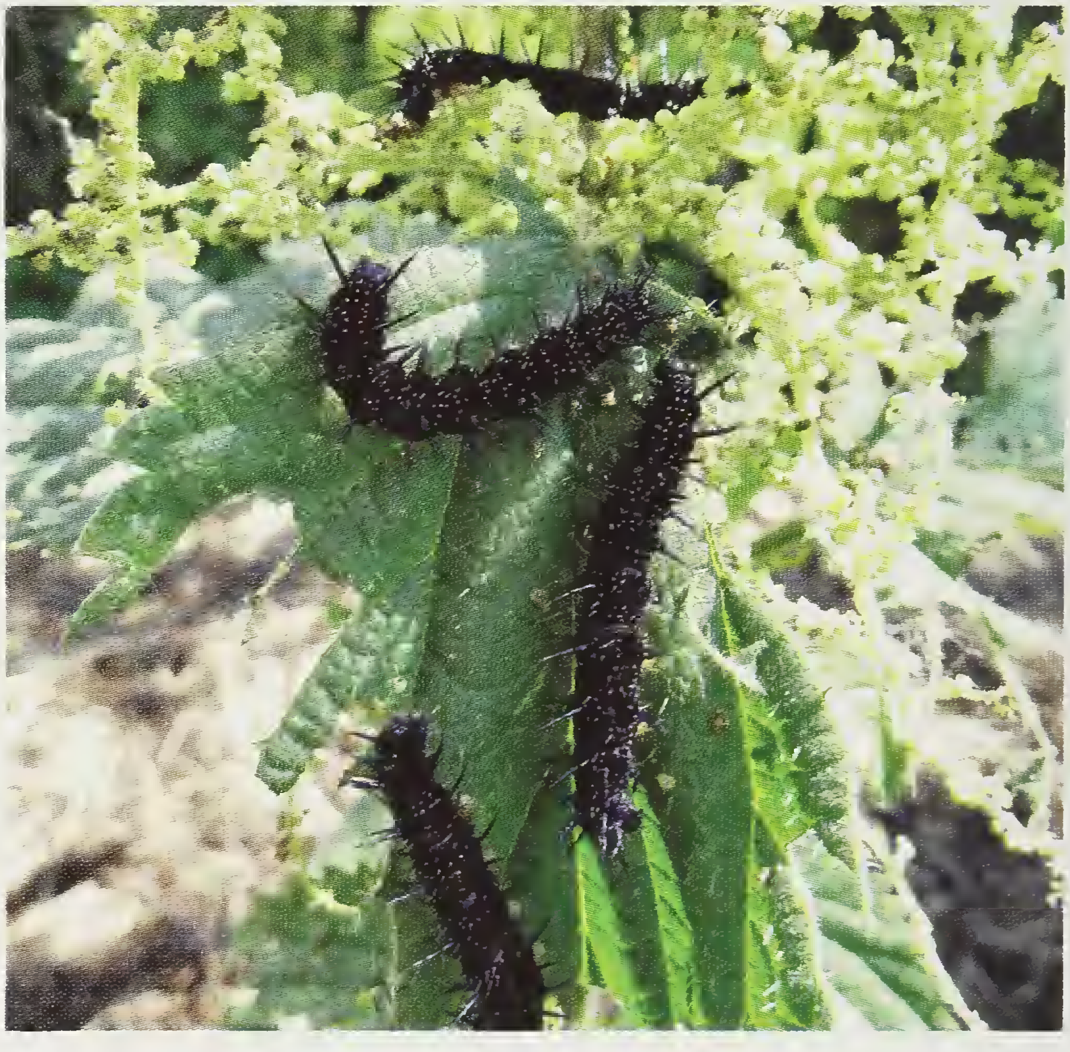

FIGURE 6. Peacock larvae feeding on nettle at London Wetland Centre, Barn Elms. ×*c.* 1. *Photo: Mike Caiden*

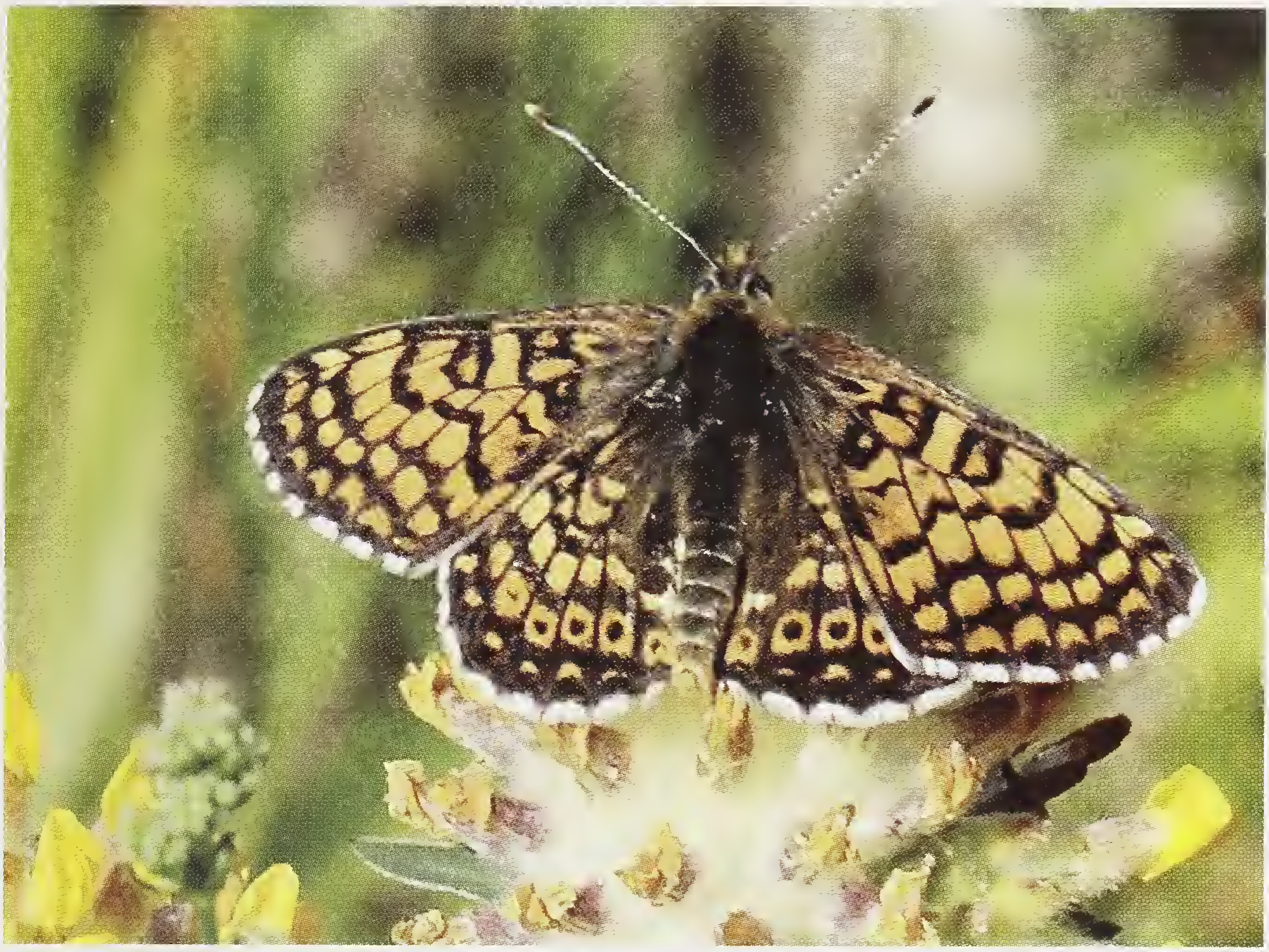

FIGURE 7. Glanville fritillary on kidney vetch *Anthyllis vulneraria*; south London. × *c.* 2.
Photo: Martin Wills

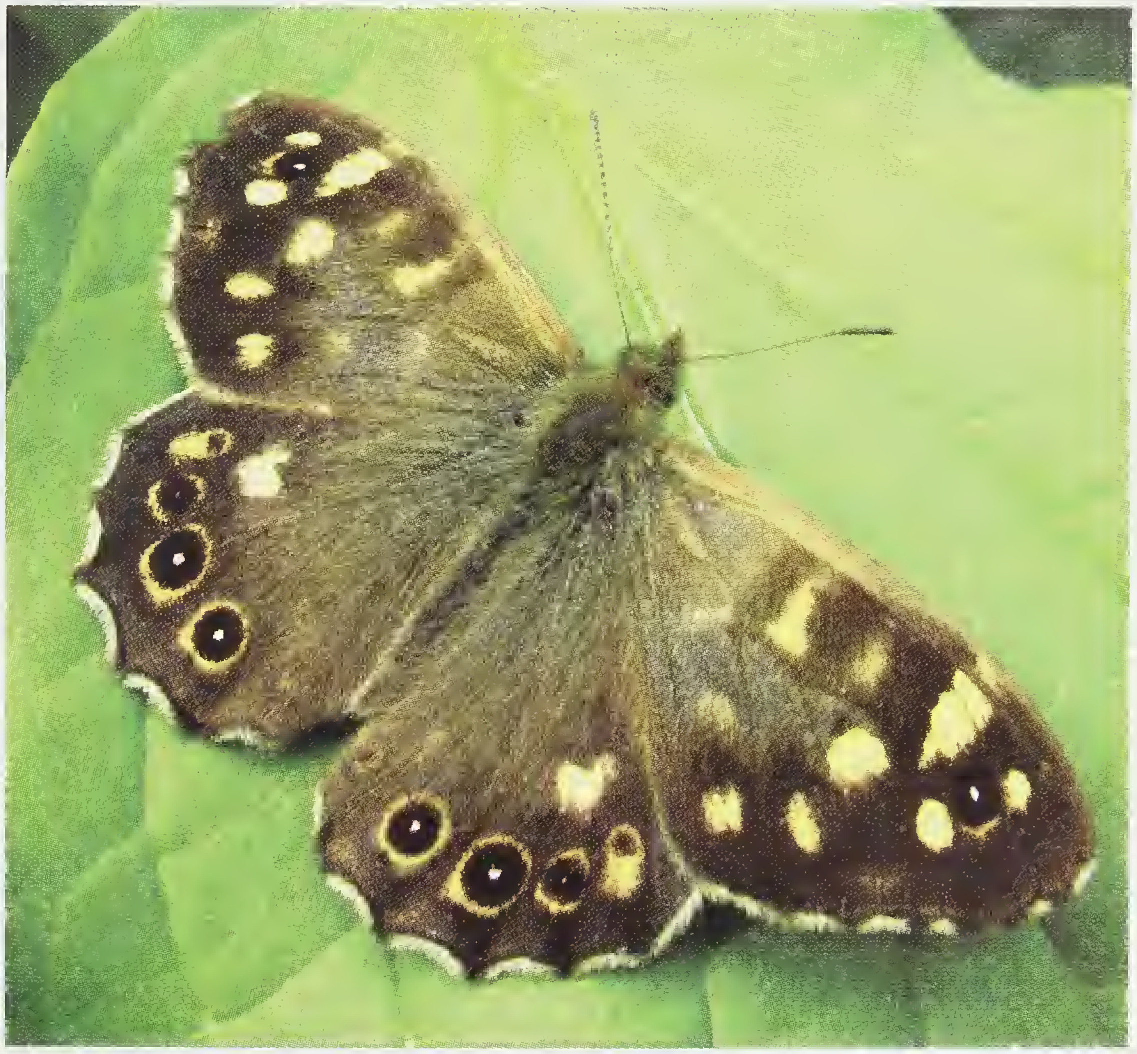

FIGURE 8. Speckled wood at London Wetland Centre, Barn Elms. × *c.* 2.
Photo: Mike Caiden

GREEN HAIRSTREAK *Callophrys rubi*

A species of unimproved grasslands with shrubs and scrub, the green hairstreak was recorded from four transects, all in south London and generally chalk-based sites but also at Mitcham Common. In Middlesex one was recorded on the Hounslow Heath transect route, though not as part of that weekly count, by Zura Kukielka (see Wood 2012). The index was the highest since comparable indices for this species commenced in the mid 1990s. Total count on transects: 39.

PURPLE HAIRSTREAK *Neozephyrus quercus* (Figure 3)

Colonies of the purple hairstreak are associated with oak *Quercus* spp. and as purple hairstreaks generally fly in the evening the species was possibly more frequent and widespread than suggested by the daytime transects. Purple hairstreaks were recorded on nine transects and particularly from the Brent Reservoir, Hounslow Heath B, and the Kenwood Estate. Chris Rose reported purple hairstreaks from locations in Bexley including The Warren south of Bexleyheath Broadway, Hall Place North, Biggs Hill, Martens Grove (a count of at least 32), and Barnehurst Golf Course. Elsewhere there were reports from Ruislip Woods; Alexandra Park; and Forty Hall at Enfield. Total count on transects: 123.

WHITE-LETTER HAIRSTREAK *Satyrium w-album*

White-letter hairstreaks use elm *Ulmus* spp. for breeding, and with the loss of mature elm trees in the 1970s, the butterfly is now associated in London with younger elm trees that have grown from suckers in hedgerows and woodland edges. In 2011 transect records were from the Brent Reservoir, Horsenden Hill, Perivale Wood and Mitcham Common. White-letter hairstreaks were also recorded from Bursted Woods, Bexley, and from Sydenham Hill Wood. Total count on transects: 10.

SMALL COPPER *Lycaena phlaeas*

Dry, unimproved grassland is the main habitat for the small copper, particularly where the main larval foodplants, common sorrel *Rumex acetosa* and sheep's sorrel *R. acetosella*, occur. Though widespread in London, nearly a third of transect sites had zero counts. Total count on transects: 240.

SMALL BLUE *Cupido minimus*

The small blue is dependent upon the sole foodplant, kidney vetch *Anthyllis vulneraria*; and in London is effectively confined to chalk grassland sites on the southern edge of London. The count at Hutchinson's Bank Nature Reserve was the highest since monitoring commenced there in 1997; and resulted in a similarly high index for London. There was one other record, in urban London, at Tower Hamlets Cemetery Park on 21 May 2011 where one was caught on the transect on long-established kidney vetch. Total count on transects: 281.

BROWN ARGUS *Aricia agestis*

While calcareous grassland is considered to be the typical habitat, the brown argus also occurs on other dry grasslands. London's results reflected this, with a preference for sites on chalk, and with other populations or records from Mitcham Common, Hounslow Heath, Horsenden Hill, Tower Hamlets

Cemetery Park and South Norwood Country Park. The index was the highest since 1997. During an LNHS visit to Bentley Priory, Harrow, on 16 July 2011, led by David Bevan, several brown arguses were seen in grassland at TQ153928, the first record of the brown argus from that site (see the field report and images by George Hounsome in LNHS *Newsletter*, 223: 12–13). Other records were from Sydenham Hill Wood and Richmond Park, while the report by Hertfordshire and Middlesex Butterfly Conservation (Wood 2012) indicated a widespread distribution in west Middlesex. Total count on transects: 102.

COMMON BLUE *Polyommatus icarus* (Figures 4 and 5)

The common blue is a species of grassland habitats and the main food plant is common bird's-foot trefoil *Lotus corniculatus*, though some other legume species are also used. Numbers were lower at most sites compared with 2010. Total count on transects: 673.

CHALKHILL BLUE *Polyommatus coridon*

Calcareous grassland with the food plant, horseshoe vetch *Hippocrepis comosa* is the habitat of the chalkhill blue. In 2011 it was recorded at two transects on chalk: Riddlesdown and Farthing Downs. Numbers, and the index were the highest since 2006. Total count on transects: 23.

HOLLY BLUE *Celastrina argiolus*

The holly blue is a widespread species dependent upon the presence of the larval food plants, particularly ivy and holly. As such it is the blue butterfly that can best adapt to urban areas; and in London appeared more a denizen of open woodland and green spaces in urban London than at sites in areas of countryside. Total count on transects: 458.

WHITE ADMIRAL *Limenitis camilla*

The white admiral is a butterfly of woodland and uses honeysuckle *Lonicera periclymenum* as the food plant. The three recorded on transects in 2011 were at Spring Park. The white admiral was also recorded from Wimbledon Common; Ruislip Woods (Neil Anderson); and elsewhere in north-west Middlesex. Beyond Greater London but within the LNHS recording area it was recorded from parts of south-east Hertfordshire (Wood 2012); and from Bookham Common. Total count on transects: 3.

PURPLE EMPEROR *Apatura iris*

The habitat of the purple emperor is broad-leaved woodland where goat willow *Salix caprea*, or grey willow *S. cinerea* occur, and it prefers larger woodlands or a landscape with numerous smaller woods and scrub. While none were recorded on transects in 2011, it was recorded in north-west Middlesex (Wood 2012); and from Addington Hills, Croydon. A male purple emperor was recorded in Eltham High Street SE9 on 11 July 2011 and had wing damage that enabled a close view. Though that record was by a local butterfly breeder, he states that this is not a species that he currently rears. Beyond Greater London but within the LNHS recording area, there were records from south-east Hertfordshire (Wood 2012) and from Bookham Common. Total count on transects: 0.

RED ADMIRAL *Vanessa atalanta*

A migratory species from Continental Europe and North Africa, the red admiral is widespread. In spring females lay eggs on nettles, the young butterflies of which emerge in about July. Over-wintering adults are occasionally observed in flight; and in 2011 there were London records in each of the months from February to November. Correction: An error in the table of indices in last year's report over-stated the index for the year 2009: this has now been corrected. Total count on transects: 261.

PAINTED LADY *Vanessa cardui*

A migrant from North Africa, the painted lady may occur in any habitat and will seek thistles as nectar sources and as the larval food plant. Numbers fluctuate greatly from year to year, as can be seen from Table 1. In 2011 it was recorded at two transects, compared with all transects in 2009. Total count on transects: 3.

SMALL TORTOISESHELL *Aglais urticae*

The small tortoiseshell occurs in a range of habitats including urban areas, and will seek the common nettle *Urtica dioica* and the small nettle *U. urens* as larval foodplants. The index increased for the third successive year from the low in 2008, though populations remained low as compared with the range of indices between 1978 (when butterfly monitoring commenced in London) and 2000. In 2011 the small tortoiseshell was recorded on the majority of transects; though on average much more noticeably from transects south of the Thames than those north of the Thames. Total count on transects: 128.

PEACOCK *Inachis io* (Figure 6)

Woodland paths, hedgerows, and gardens are habitats for the peacock though they may occur in other habitats seeking nectar plants or the common nettle *Urtica dioica* for egg laying. While the peacock remained widespread, numbers declined on almost all transects compared with 2010 and the index was the lowest since 1990. Total count on transects: 375.

COMMA *Polygonia c-album*

The comma has a preference for hedgerows, woodland edges and gardens and may also be found elsewhere seeking the main food plants. The index reduced and was the lowest since 1996 though some of the other intervening years had indices nearly as low. Total count on transects: 322.

DARK GREEN FRITILLARY *Argynnis aglaja*

The dark green fritillary is a butterfly of grasslands, light scrub and other open habitats. Various species of violet *Viola* spp. are the larval food plants. Six were recorded at Hutchinson's Bank Nature Reserve which was the highest count and made for the highest index for some years. Total count on transects: 6

SILVER-WASHED FRITILLARY *Argynnis paphia*

The silver-washed fritillary has a preference for broad-leaved woodland in which the common dog-violet *Viola riviniana* grows, though the adult butterflies are typically found along sunny paths and in glades. Most of the 2011 records were from monitored transect sites on the southern edge of London, though two were recorded on the transect at Tower Hamlets

Cemetery Park following records in 2006 and 2009. There were also records from Oak Hill Woods Nature Reserve in Barnet; Fryent Country Park (by Tony Kwissa on 15 July 2011), the first record for that site; Ruislip Woods; Chapel Bank, Croydon; High Elms, Bromley; and beyond Greater London but within the LNHS recording area, at Bookham Commom. Total count on transects: 8.

GLANVILLE FRITILLARY *Melitaea cinxia* (Figure 7)

The Glanville fritillary is a species for whom the distribution had become restricted, and largely confined to coastal landslips, particularly on the Isle of Wight and the Channel Islands. In 2011 there were records from one site in London though at the time of the preparation of this paper, it is too early to report on the status of the population.

SPECKLED WOOD *Pararge aegeria* (Figure 8)

Typically found along paths and in glades in woodland flying in the dappled sunlight of the partial shade, the larval food plants are various grasses. In the 1980s (Plant 1987) and early 1990s it spread from the south to colonize much of urban and north London; and is now one of the most widespread and common butterfly species in London. In 2011 it was recorded on all but one transect. Total count on transects: 2,452.

WALL *Lasiommata megera*

Whilst populations of the wall declined rapidly in London in the 1990s, the species was recorded at Rainham Marshes in 2011 where it was noted on the river wall. Total count on transects: 0.

MARBLED WHITE *Melanargia galathea*

The habitat of the marbled white is unimproved, rough grassland preferably containing red fescue *Festuca rubra*. In London the marbled white was primarily a species of chalk grassland sites with established populations also at the Brent Reservoir, Mitcham Common, Horsenden Hill, and single records from Perivale Wood and Hounslow Heath. Away from transects, the marbled white was recorded at Ruislip Woods where they have reportedly colonized within the last few years (Neil Anderson, LNHS *Newsletter*, 222: 20); and one was seen at Fryent Country Park. Total count on transects: 422.

GATEKEEPER *Pyronia tithonus*

Two English names for this species, gatekeeper and hedge brown, aptly describe the typical habitat of hedgerows, woodland edges and paths, rough grassland and scrub. Plant (1987) noted that in the 1980s the species had an approximately circum-London distribution but it has since colonized more urban areas. In areas of north-west London for example, the colonization and then establishment of populations appeared to commence in the early to mid 1990s. The gatekeeper has become one of the more common species in London and can now often be seen in parks, gardens and other green spaces. In 2011 it was recorded on all but one transect, and as much in green spaces within urban London as in the outer London areas. Total count on transects: 2,788.

MEADOW BROWN *Maniola jurtina*

The meadow brown prefers more-open areas than the gatekeeper with rough grassland or hay meadows, the management of which is conducive to the growth of the larval grass food plants. Numerically the most common species recorded from transects in London, that is to some extent a reflection on the predominance of transect recording at nature conservation sites; and it is less likely than the gatekeeper to be seen in urban areas. Recorded on most transects in 2011. Total count on transects: 6,081.

RINGLET *Aphantopus hyperantus*

The ringlet is a species of rough grassland in and near to woodland. In London the distribution was primarily at chalk grassland sites on the southern edge of London but was also recorded at green spaces within urban London including Mitcham Common, the Brent Reservoir, South Norwood Country Park, Hounslow Heath, Sydenham Hill Wood, and the first two on the transect at Railway Fields. Four were recorded on the new Bedfont Lakes transect. Away from the transects, there were records from Wimbledon Common; Ruislip Woods, Hillingdon from where Neil Anderson (LNHS *Newsletter*, 222: 20) reported that ringlets first colonized the site in 2000 and had since become common; Bentley Priory, Harrow during the LNHS visit on 16 July 2011; Alexandra Park; fields near to Enfield Lock; fields by Hadley Wood Station; and following the first record of a ringlet on the eastern edge of Fryent Country Park in 2010, one was recorded in 2011 on Barn Hill several hundred metres further into the Park. Total count on transects: 845.

SMALL HEATH *Coenonympha pamphilus*

The small heath occurs in short, well-drained grasslands, where the larval food plants of fine-leaved grass species occur. In London the index was the highest since 1992 with large numeric increases compared with recent years at chalk grassland sites on the southern edge of London, and also at established colonies elsewhere, particularly at Hounslow Heath. Small heaths were recorded at Cranford Park, and on the new transect at Bedfont Lakes. There were small numbers at the London Wetland Centre and one on the transect at Perivale Wood; and away from the transects at Wimbledon Common, and Trent Park. However the small heath remained effectively absent from large areas of urban London. Total count on transects: 994.

Discussion

Changes in the distribution and abundance of butterfly species in London reflects factors affecting butterflies in south-east England; and the local factors of habitat available within London, the connectivity of that habitat and the ecology of individual species. At the time of writing, the national transect results were available up to 2010 (Botham et al. 2011), while Butterfly Conservation (Fox et al. 2011) have commented on the conservation implications of the trends. Within London the distribution and abundance of several species has changed significantly since the LNHS survey of the early 1980s (Plant 1987), as was highlighted by Fox and Williams (2006). And change is continuing.

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Moorhouse at Mitcham Common 'route A'; Martin Boyle at Mitcham Common 'route B'; Richard Bullock at Wildfowl and Wetlands Trust Wetland Centre at Barn Elms; Catherine Price, Caroline Graty, Keith Shallcross, Mary Hogan and Faye Duffill at Railway Fields; Martin Wills at Hutchinson's Bank Nature Reserve; John Grayley, Alison Shipley and N. O'Connor at Cranford Park; Malcolm Bridge at South Norwood Country Park; Terry Lyle at Tower Hamlets Cemetery Park; Andy Brown at Gunnersbury Triangle; Andrew Self and Roy Beddard at Brent Reservoir; Donald Rooum at Regent's Canal towpath from Mile End Road to Mare Street; Andrew Scott at Riddlesdown Quarry; Mike Taylor at Kenwood Estate; David Howdon, Andrew Culshaw and Martin Smith at Horsenden Hill East, Horsenden Hill West and Perivale Wood; Sarah Burton and Andrew Scott at New Hill; Luke Barley and Barry Gutteridge at Spring Park; David Green, Susan McCabe, Rachel Evers, Jane Clarke and Robin Davey at Camley Street Nature Park; Zura Kukielka and Rob Solomon at Hounslow Heath B; Ashley White at Sydenham Hill Wood; and by Richard Featherstone, Zura Kukielka and Kayla Terry at the new transect at Bedfont Lakes.

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Book review

Scotland. Looking at the natural landscapes. Peter Friend, with Leah Jackson-Blake and James Sample. New Naturalist No. 119, Collins, London. 2012. 466 pp. Softback, £30, ISBN 978 0 00 735906 6; hardback, £50, ISBN 978 0 00 730956 6.

In his earlier New Naturalist book *Southern England,* Peter Friend described how the flora and fauna of this lowland area of Britain is influenced and largely determined by the underlying geology — in that case, a mainly sedimentary suite of 'soft' rocks. In *Scotland* he applies the same principles to a country of quite different character, consisting mainly of 'hard' igneous and metamorphic deposits including, in the Lewisian gneisses, Britain's oldest rocks. The book begins with an overview of geological processes and how they shape the landscape, obviously with special reference to Scotland, and ends with a brief summary of the larger tectonic movements that put Scotland where it is now. In between are chapters dealing in turn with each region of Scotland, from Galloway to Shetland. Like other recent New Naturalists, this is profusely illustrated, with 325 photographs, maps, charts and diagrams, all in full colour. Together with the author's easy style this makes the book very attractive. The spectacular scenery in the photographs is alone sufficient incentive for non-geologists to buy it, though someone with no previous exposure to the science will find themselves referring back quite often to clarify a mechanism or concept.

A difficult decision is how to treat an area as geologically complex as Scotland without making the units unmanageably small. The choice adopted here is to divide the country into nineteen blocks, bounded by straight north-south and east-west lines and each of roughly the same area. Each chapter is a self-contained account of one region — Glasgow, say, or Caithness. This makes it easy for a visitor, or someone with an interest in a specific part of the country, to find all he or she needs to know in one place, and in some regions, such as Skye, the boundaries respect the geology. But in many of the mainland regions this is not the case, with some unfortunate consequences. Thus, for example, isostatic adjustment following the retreat of the ice-sheets is a common phenomenon across most of the country, yet the concept is explained *de novo* in several chapters. And there are awkward differences in both the colour-coding and the type of information presented on the geological maps provided for each region, so that where regions share a common boundary there can be an alarming, and confusing, mismatch (this is particularly evident when comparing maps of the adjoining regions Rannoch and Dundee). The regional basis of the text also means that discussion of Scotland's most distinctive features, including faultlines such as the Highland Boundary and Great Glen Faults, is scattered amongst various chapters.

But these are minor criticisms. This book is a tribute to the author's expository skills and profound knowledge of the country of his childhood, and to his colleagues at the University of Cambridge whose input and encouragement he acknowledges. I pity the Londoner whom it does not inspire to visit Scotland.

JOHN EDGINGTON

Spider records for 2010 and 2011 for the London Area, including the discovery of a spider new to Britain

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Abstract

Spider records in 2010 and 2011 for the London Area (the old counties of London and Middlesex) are detailed. The two years were very similar and altogether there was one new record for London in 2010 (*Erigonella ignobilis*), and two for London in 2011 (*Ero aphana* and *Anyphaena sabina* — new to Britain). A further 'new record' for London was the first specimen of *Pardosa agrestis* taken at ground level (previous London records appear to have all been from green roofs). There were no new spider records for Middlesex in 2010 or 2011, but in 2010 the ichneumonid parasite *Reclinervellus nielseni* was recorded for the first time in the county on its host *Cyclosa conica* (Araneidae).

Introduction

As for the previous two years, 2010 and 2011 have been relatively poor for spiders, with scarcer species not seen and only a handful of interesting records. The total numbers of species recorded were 140 in 2010 and 137 in 2011 (compared with 192, 211 and 153 in the three years 2005–2007), only partly explained by the lower number of pitfall-trapping sites maintained by the author. Trapping did continue at Mile End Park, Tower Hamlets Cemetery Park (both London), Coldfall Wood and Queen's Wood (both Middlesex).

In the account below, all the records not otherwise credited are by the author. Nomenclature and the order of families are according to Merrett and Murphy (2000) and Harvey et al. (2002).

Spider activities in 2010 and 2011

In 2010 spider forays were held at Hounslow Heath in June (followed by a brief but productive visit to the garden of the Quaker House in Brentford) and Highgate Cemetery in October. In 2011 the Society's summer spider foray visited Wanstead Flats (Essex), and in October the winter foray visited the Welsh Harp. There were also forays to Hampstead Heath with the HH Study group, and the writer ran informal spider forays for the local community at Tower Hamlets Cemetery Park, Mile End Park, Queen's Wood and Coldfall Wood. In terms of new records none of these forays was particularly successful, the catch being limited in both numbers and diversity although one of the new records was found during the foray at Tower Hamlets Cemetery. Perhaps London spiders are getting fed up being hunted down by avid arachnophiles!

New and interesting spider records in the London Area for 2010 and 2011 in family order

New county records are marked * for London and ** for Middlesex. Notes on habitat and wider distribution are based on the 'Checklist' pages of the website www.britishspiders.org.uk where further information and photographs of many spider species can be found.

MIMETIDAE

*Ero aphana**. This tuberculate mimetid spider is a relatively recent arrival in Britain, the first records dating from 1974. Its preferred habitat is low bushes and scrubland; in Middlesex it has been recorded at several sites but the single female found in the Lodge Graves area of Tower Hamlets Cemetery Park during the spider foray in May 2011 was the first record for the old county of London. This spider is expanding its range quite rapidly and although most records are for the south-east of England it has been recorded as far west as Devon and as far north as Nottinghamshire (BAS website).

THERIDIIDAE

Anelosimus aulicus. This tiny tangle-web spider was recorded previously from a pitfall trap at Hounslow Heath in 2006 (at the time this was the most easterly record in England for the species). During the 2010 foray a single male was swept from bushes at the same site. Since 2006 *A. aulicus* has been recorded from two localities in Essex.

Simitidion simile. A single male of this widespread heathland spider was swept from gorse at Wanstead Flats during the spider foray in June 2011. This spider appears to be absent from most of the London Area (although present nearby in Essex) there being only small patches of suitable habitat; the nearest other record to the south or west of Wanstead is Keston Common in Bromley.

LINYPHIIDAE

*Erigonella ignobilis**. A single male of this scarce money spider, characteristically found in wetland, was trapped in the low ‘scrape’ at Mile End Park where topsoil has been removed and the area left untouched so that a semi-natural succession of vegetation can develop. Since the excavation of the scrape in the winter of 2009/10 pitfall-trapping has been operated and several other pioneer species found (as new records for the Park) including *Prinerigone vagans, Oedothorax apicatus* and *Pardosa agrestis* (see below).

Megalepthyphantes collinus australis. The precise status of this species has yet to be confirmed but it is expected to be described as a new species based on specimens from the Thames Gateway and Tower Hamlets Cemetery Park (see www.britishspiders.org.uk). The spider is very similar to *Lepthyphantes nebulosus* but much larger; some old records for *L. nebulosus* (including those referred to in Milner, 2010) are now thought to refer to this new species. In 2010 the new species was recorded from two additional sites: Mile End Park and Highgate Cemetery.

LYCOSIDAE

Pardosa agrestis. This Nationally Notable B wolf spider is widespread in England but scarce; it seems to require an open habitat with plenty of bare ground and as such can be considered a pioneer species in temporary habitats; most national records are from coastal sites, chalk pits, etc. In London it has previously been reported only from green roofs in dockland, and the Mile End Park ‘scrape’ would appear to have offered it an ideal habitat. Subsequently (2012) the vegetation in the ‘scrape’ has closed in so that now there is virtually no bare soil, and this species will probably disappear from the site.

ANYPHAENIDAE

Anyphaena sabina. In July 2011 a single female *A. sabina*, a spider new to Britain, was trapped at Kirk's Place, Mile End Park, in the same area where a rare beetle, the striped bombardier *Brachinus sclopeta* (Carabidae), was trapped. This is a scrubby area with some brick rubble, tussocks of cocksfoot *Dactylis glomerata* and small buddleia *Buddliea davidii* bushes. The writer reported this find (Milner 2012) to the National Spider Recording Scheme in March 2012. Neither subsequent trapping nor sweepnetting has so far produced any further specimens.

PHILODROMIDAE

Thanatus striatus. The spider foray to Wanstead Flats (Essex) produced a single female of this crab-spider. The species has not been recorded in London county but is known from Roding Meadows a little way north of Wanstead and has been found frequently at Bushy Park (Middlesex) and Richmond Park (Surrey) on the western outskirts of the conurbation.

SALTICIDAE

Macaroeris nidicolens. Various tours and visits at Mile End Park confirmed the presence of the Mile End jumping spider *Macaroeris nidicolens* on the Corsican pines in both years.

Spider parasite

Reclinervellus nielseni. An external parasitic larva identified as *R.nielseni* (Fitton et al. 1987) was found attached to the abdomen of a male *Cyclosa conica* spider trapped in April 2010 next to a bramble patch in Queen's Wood. This was the first record of a parasite on this spider in the London Area.

Acknowledgements

I would like to thank Dr Peter Merrett, Peter Harvey and Mark Shaw for identifying some of the specimens referred to.

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MILNER, E. 2012. New *Anyphaena* species recorded in London, a second species new to Britain from Mile End Park, Tower Hamlets. *S.R.S. News* No. 72 in *Newsl. Br. arachnol. Soc.* **123**: 23–24.

Book review

Collins fungi guide. Stefan Buczacki. Illustrated by Chris Shields and Denys Ovenden. Collins, London. 2012. 640 pp. Hardback ISBN 978 0 00 724290 0, £35.00; paperback ISBN 978 0 00 746648 1, £19.99.

This ambitious work claims on its cover to be the most complete fully illustrated field guide to the mushrooms and toadstools of Britain and Ireland. Stefan Buczacki and his illustrators, Chris Shields and Denys Ovenden, have certainly met their target by illustrating and describing over 2,400 species of fungi native to our area. In comparison, the next most comprehensive field guide, that by Courtecuisse and Duhem (1995)[1] (also a Collins Field Guide) illustrated only 1,750 species. C&D, as it is affectionately known to field mycologists, was translated from French by Jo Weightman but is now out of print in English and in need of an update. One obvious way to judge the new guide is on whether and to what extent it succeeds in replacing and updating C&D. Will the new guide come to be affectionately known as BS&O? The importance of the illustrators in the project cannot be overstated, since a clear intention of this guide is to promote identification by picture comparison. There are perfunctory 'keys' at the start of the book, which ask firstly whether the fungus has gills and if so what colour is the spore print. Five keys according to spore colour follow, each of which consists of a collection of thumbnails, one per genus. A *Cortinarius* key hangs off the end of the gilled toadstool keys as though its spore prints were colourless. Boletes, brackets and resupinates are dealt with by a selection of thumbnails for each group. Whilst unlikely to lead a beginner to the right genus, these keys serve as a handy index to the book for anyone who has weathered a few seasons in the field.

The acid test of a field guide must be the likelihood, given a specimen in hand, of correctly identifying it to species. A criticism of the book is that each taxon is represented for the most part by a single mature fruit body seen from the side without dissection. The descriptions are brief and to the point. No colour descriptions of pileus or stem are given since the illustrations are there to represent the spectrum. Consequently, with only this guide to help I doubt that anyone beginning mycology could be correct more than a tenth of the time in identifying an unknown. This could be put to the test at a public foray and would make an interesting study.

Below genus level BS&O aims to illustrate every species that has been reliably identified in these islands, according to the definitive checklist of Basidiomycetes (Legon and Henrici 2005)[2]. All the bonnets are there, likewise the brittlegills, milkcaps and webcaps. This should put anyone off making a snap diagnosis. Due to the lack of infrageneric keys this entails that firm identification is only possible with BS&O for fruit bodies that have an absolutely characteristic unique visual appearance of the whole uncut mature fruit body and/or in which characters described in the text are totally discriminatory. In my opinion that is true of less than ten per cent of our funga (the percentage may increase with experience). A great strength of the book is the comprehensive illustration and description of most of our brackets and resupinates, which C&D hardly touch upon and for which we have up to now relied on Phillips (2006)[3] and Continental monographs. Well — we still need the monographs (and ideally an expert such as Martyn Ainsworth) to identify an unusual bracket or resupinate fungus, but here is a highly creditable effort to show what all the British species are supposed to look like. In conclusion, this guide does replace C&D to a considerable extent, allowing for the absence of usable keys. For keys to genus one must turn to MycoKey[4] or Mozer (1983)[5] and for species to *Funga Nordica*[6] or monographs such as those of Geoffrey Kibby[7]. That said, BS&O is a major contribution to field mycology in our area, with its lavish and comprehensive illustrations and detailed descriptions.

Any serious amateur mycologist will wish to own and peruse it. Dick Emery's catch phrase 'Ooh you are awful but I like you' sums up my reaction.

1. COURTECUISSE, R. and DUHEM, B. 1995. *Mushrooms and toadstools of Britain and Europe.* HarperCollins. London.
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3. PHILLIPS, R. 2006 *Mushrooms.* Ed. 2. Macmillan.
4. MycoKey downloadable from http://www.mycokey.com/
5. MOZER, M. 1983. *Keys to agarics and boleti.* Phillips, Tonbridge.
6. KNUDSEN, H. and VESTERHOLT, J. 2012. *Funga Nordica.* Nordsvamp, Copenhagen.
7. KIBBY, G. 2012. Guides to the genera *Russula, Amanita, Agaricus* and *Boletus* in Great Britain. Available from author.

EDWARD TUDDENHAM

Odonata report for 2011

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An exceptionally warm April led to some of the earliest emergences on record. It's common for a few species such as large red damselfly *Pyrrhosoma nymphula* to emerge in April. I don't normally see them until May. This year twenty species were seen before the end of April nationally and I managed to see seven by the end of the month. The first record for our area received was predictably of a large red damselfly on 12 April (nationally the first was in March) at London Wetland Centre (LWC). My first was five days later at Ten Acre Wood.

Reports from Wake Valley Pond, Epping Forest of downy emeralds *Cordulia aenea* taking their maiden flights on 24 April beat the previous early record by ten days for the observer. This local species was reported as abundant here by mid May and there were also good numbers of hairy dragonflies *Brachytron pratense* present. The latter species, which seems to be expanding both locally and nationally, was again recorded at LWC. I also saw several at Rainham RSPB Reserve over Easter.

Outside our area and before the resident species started emerging, the first dragonfly of the year was a vagrant emperor *Anax ephippiger* in Pembrokeshire on 9 January, with up to twenty of this rare migrant recorded nationally by mid May. The only ones recorded in the South-East were three at Dungeness and one near Dover. There was a large wave of this species moving through Portugal during late summer and autumn resulting in further records during October and November in the UK. It is thought a minimum of thirty-nine individuals were seen nationally during 2011 with another twenty or so probable sightings. This represents the largest ever influx of this species in the UK. Breeding behaviour was recorded in Cornwall in both April and October but there is no evidence that this has been successful.

By early May broad-bodied chasers *Libellula depressa* seemed to be around in good numbers. I was pleased to count nine in Poor's Field, Ruislip Woods. The earliest national record for the first ruddy darter *Sympetrum sanguineum* this year was in our area at South Norwood Lake on 25 May, which is a good couple of weeks earlier than expected.

After a fantastic start to spring, numbers of Odonata seemed to be somewhat low for most of the widespread species later in the season, something I noticed at many sites I regularly watch and also noted by some other observers both locally and in other parts of the country. It's difficult to be certain of the causative factors; perhaps a combination of mediocre weather last summer reducing breeding activity, severe December weather may have affected more southerly species or even the very dry spring affecting water levels. An example of dragonfly paucity was a lunchtime walk around the ponds on Wandsworth Common on 2 September, which was a very sunny day, with a temperature high of 25°C and not a single dragonfly to be found.

On the Bookham Study Day we saw very little on the Isle of Wight Pond with singles of emperor *Anax imperator*, broad-bodied chaser and ruddy darter with just a few damselflies recorded. It was good to see a male beautiful demoiselle *Calopteryx virgo* near Merritt's Cottage showing a continued presence on the Common, though sadly the stream where they are suspected to breed had dried up. There was another record of this species in our area of a second male at Whitewebbs Wood on 30 and 31 July. I would like to receive any records of this species in our area as it may be on the verge of colonization.

After a blank last year following dredging work it was good to receive a record of a brilliant emerald *Somatochlora metallica* from the one regular station in our area at Black Pond, Esher Common on 11 July.

A field trip to Hadleigh Country Park near Benfleet, Essex just outside our area on 30 July resulted in several scarce emerald damselflies *Lestes dryas* being seen by the pond and along the dykes. The real highlight though was superb views of a male southern migrant hawker *Anax affinis*. Following last year's unprecedented influx of this species with several recorded at this site, breeding was proved by exuviae found earlier this year. This represents the first known UK breeding for this species so it was exciting to see this male. No females were recorded here in 2011 so this may be a temporary toehold here, though hopefully with new arrivals in future years it can be added to the list of newly colonizing species following small red-eyed damselfly *Erythromma viridulum* and willow emerald damselfly *Lestes viridis.*

A day later a willow emerald damselfly was also recorded at this site. This new colonist now seems fully established in parts of Suffolk with records also now in Norfolk, Essex and Kent. This is a species that I anticipate will be recorded in the eastern part of our recording area in the next couple of years. Just outside our area there was good news of successful breeding by the formerly extinct (in UK) dainty damselfly *Coenagrion scitulum* on the Isle of Sheppey. Also in Kent, southern emerald damselflies *Lestes barbarus* at Cliffe pools were recorded in a ditch which is another species that may also consolidate its status here. These are clearly exciting times for Odonata recording.

Finally, the very mild autumn allowed a few late-season species to linger later than normal. Normally common darter *Sympetrum striolatum* is the last species to be recorded for the year but the latest record I have for 2011 is of a migrant hawker *Aeshna mixta* on 16 December at Rainham RSPB Reserve.

Fungal records for 2011; a selection based on one foray and some notable finds

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Abstract

A selection of fungal records from a Society foray and other sources are compiled and presented in standard format. Some notable finds in Alexandra Park are commented on in more detail. The recorder's plans for filling in the gap in records and for future recording are stated.

Introduction

Recording fungi presents special problems. The appearance of fruiting bodies, by which the presence of the organism in a substrate is manifested, is fleeting and unpredictable. Even when a carpophore is seen its identification is always a challenge. With practice a few hundred of the more than 14,000 species can be recognized in the field but most require patient research in guides and microscopy with chemical tests for a diagnosis to be reached with any confidence. Hence any set of fungal records is to be regarded as partial and provisional. The records presented here are of such a character, more like 'the stuff that dreams are made on' than solid scientific data.

Methods

The records of one foray held on 30 October 2011 around four sites in the London Borough of Haringey form the core of this report. A group of about fifty forayers work over the same four sites each year on the last Sunday of October, bringing all fungi to a central point for sorting. The collections are returned to Railway Fields conservation centre for further sorting, identification and if edible — cooking and eating. Difficult taxa are subjected to further investigation. Notable records come to the recorder's attention mostly through personal correspondence and an online group devoted to fungal recording in the London area (http://uk.groups.yahoo.com/group/londonfungi/).

Results

The table below is a report prepared using the software recording package MycoRec which is also used for compiling the national database — Fungal Records Data Base of the British Isles — FRDBI (http://www.

fieldmycology.net/). It contains eighty-six records of seventy-five species. Obviously this is a tiny fraction of all the records that could be made in our area and a very small subset of those that have been made. The weather is by far the most important factor influencing fungal fruiting although its exact impact is mysterious both as to mechanism and the response of individual species. Perhaps only two firm influences are known, dry weather reduces fruiting and wet weather promotes fruiting. The fungal fruiting periods in 2011 were unusual in that there was a remarkable appearance of boletes in late summer with many species not seen before in our area making an appearance. The autumn flush was also unusual in length, with fruiting of autumn species continuing uninterrupted into January 2012.

Notable finds

The late summer rains of 2011 produced an abundance of boletes, both common and rare. The boletes are fungi that have tubes where the agarics have gill plates. As such they are an instantly recognizable group within the kingdom Fungi. Britain hosts about a hundred boletes, according to the fourth edition of a guide by Kibby (2012). *Boletus legaliae* put in its first appearance in Middlesex in late August 2011 under a large oak tree in Alexandra Park (see figure on page 32 in author's Presidential Address). Several carpophores with characteristic deep red pores, a swollen stipe with a fine red network and flesh bluing on being cut confirmed the identity of this uncommon species. Formerly known as *B. satanoides* there has been some confusion in nomenclature but recent expert taxonomic opinion has settled on *B. legaliae*. Also found in Alexandra Park by Ed Taylor and Keir Mottram was another rarity new to Middlesex, the poplar knight *Tricholoma populinum*. Not as charismatic as the bolete but recorded from very few sites, it has found a home under the grove of poplars on the south slope of the park along the edge of a path.

Acknowledgements

All forayers, for collecting specimens on the annual Haringey foray and throughout the year; and to Keir Mottram, for unfailingly correcting my hopeful misidentifications, and to my wife for allowing me time to prepare this report.

References

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TUDDENHAM E. 2006. Fungal records for 2005. *Lond. Nat.* **85**: 199–225.

Apologies

This report appears after a gap of five years since the last report on fungi for 2005 (Tuddenham 2006). During this period there has been a busy and increasing programme of forays in the London area. Thousands of fungus records are known to the author, which have yet to be entered in a database, let alone reported to the Society. The author pleads pressure of work in a new post from 2006 to 2011. He had hoped that retirement in 2011 would allow leisure to bring the records up to date, but this has not happened. Pressure of work both scientific and domestic has increased. However he intends that the records of the Haringey forays and other reports from the London boroughs may lead eventually to the publication of a London Funga to complement the London Flora.

FUNGAL RECORDS FOR NORTH LONDON, 2011

Taxonomic index

Agrocybe rivulosa

Wood chips, grassland and scrub, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 30.xi.2011, Herb.: E.G.D. Tuddenham.

Erisyphe dipsoaceae

As *Erisyphae dipsoaceae*, *Dipsacus fullonum*, leaf, parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: B. Wurzell, Det.: B. Wurzell, 30.xi.2011, Herb.: Anon.

Erisyphe gallipsidis

As *Erisyphae gallipsidis*, *Lamium album*, leaf, parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: B. Wurzell, Det.: B. Wurzell, 30.xi.2011, Herb.: Anon.

Phylactinia fraxini

As *Phylactinea fraxini*, *Fraxinus excelsior*, leaf, parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: B. Wurzell, Det.: B. Wurzell, 30.xi.2011, Herb.: Anon.

Puccinia leginophorae

Senecio squalidus, leaf, parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: B. Wurzell, Det.: B. Wurzell, 30.xi.2011, Herb.: Anon.

Uromyces galligae

Doubtful record, *Galega officinalis*, leaf, parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: B. Wurzell, Det.: B. Wurzell, 30.xi.2011, Herb.: Anon.

ASCOMYCOTA

ASCOMYCETES

ERYSIPHALES

Erysiphaceae

Erysiphe cichoracearum* var. *cichoracearum

As *Erysiphe cichoracearum*, *Picris echioides*, leaf, parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: B. Wurzell, Det.: B. Wurzell, 30.xi.2011, Herb.: Anon.

Erysiphe cruciferarum

Sinapis arvensis, leaf, parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: B. Wurzell, Det.: B. Wurzell, 30.xi.2011, Herb.: Anon.

Erysiphe sordida

Plantago major, leaf, parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: B. Wurzell, Det.: B. Wurzell, 30.xi.2011, Herb.: Anon.

Microsphaera alphitoides

Leaf, parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: B. Wurzell, Det.: B. Wurzell, 30.xi.2011, Herb.: Anon.

Microsphaera trifolii

As *Erysiphe trifolii*, *Onobrychis viciifolia*, leaf, woodland and scrub, Site: Railway Fields, TQ316881, Middlesex, Col.: B. Wurzell, Det.: B. Wurzell, 30.xi.2011.

Sawadaea bicornis

Acer pseudoplatanus, leaf, woodland and scrub, Site: Railway Fields, TQ316881, Middlesex, Col.: B. Wurzell, Det.: B. Wurzell, 30.xi.2011, Herb.: B. Wurzell.

Sawadaea tulasnei

Acer platanoides, leaf, parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: B. Wurzell, Det.: B. Wurzell, 30.xi.2011, Herb.: Anon.

HYPOCREALES

Nectriaceae

Nectria cinnabarina

Grassland and scrub, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 30.xi.2011, Herb.: E.G.D. Tuddenham.

Wood, dead, parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, 30.xi.2011, Herb.: Anon.

Salix, wood, dead, woodland and scrub, Site: Railway Fields, TQ316881, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 30.xi.2011, Herb.: E.G.D. Tuddenham.

PEZIZALES

Helvellaceae

Helvella crispa

Woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: M. Spencer, Conf.: K. Mottram, 30.x.2011, Herb.: Anon.

Pyronemataceae

Otidea onotica

Woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: M. Spencer, Conf.: K. Mottram, 30.x.2011, Herb.: Anon.

XYLARIALES

Xylariaceae

Daldinia concentrica

Wood, dead, parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, 30.xi.2011, Herb.: Anon.

Fraxinus excelsior, wood, dead, grassland and scrub, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 30.xi.2011, Herb.: Anon.

Hypoxylon fragiforme

Woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: M. Spencer, Conf.: K. Mottram, 30.x.2011, Herb.: Anon.

Kretzschmaria deusta

Wood, dead, parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: H. Thomas, 30.xi.2011, Herb.: Anon.

Xylaria hypoxylon

Wood, dead, woodland and scrub, Site: Railway Fields, TQ316881, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 30.xi.2011.

Xylaria polymorpha

Wood, dead, woodland and scrub, Site: Railway Fields, TQ316881, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 30.xi.2011, Herb.: E.G.D. Tuddenham.

BASIDIOMYCOTA

BASIDIOMYCETES

AGARICALES

Coprinaceae

Coprinus atramentarius

Soil, woodland and scrub, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 30.xi.2011, Herb.: E.G.D. Tuddenham.

Parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 30.xi.2011, Herb.: Anon.

Coprinus comatus

Leaf, fallen, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 30.x.2011, Herb.: Anon.

Psathyrella multipedata

Grassland and scrub, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 30.xi.2011, Herb.: E.G.D. Tuddenham.

Psathyrella piluliformis

Woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: M. Spencer, Conf.: K. Mottram, 30.x.2011, Herb.: Anon.

Cortinariaceae

Gymnopilus junonius

Wood, dead, parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, 30.xi.2011, Herb.: Anon.

Inocybe geophylla* var. *geophylla

As *Inocybe geophylla*, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: M. Spencer, Conf.: K. Mottram, 30.x.2011, Herb.: Anon.

Hydnangiaceae

Laccaria amethystina

As *Laccaria amethystea*, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: M. Spencer, Conf.: K. Mottram, 30.x.2011, Herb.: Anon.

Marasmiaceae

Armillaria gallica

Wood, dead, parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, 30.xi.2011, Herb.: Anon.

Pleurotaceae

Pleurotus pulmonarius

Fagus sylvatica, wood, dead, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 30.x.2011, Herb.: E.G.D. Tuddenham.

Pluteaceae

Amanita citrina* var. *citrina

As *Amanita citrina*, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: M. Spencer, Conf.: K. Mottram, 30.x.2011, Herb.: Anon.

Amanita muscaria

Parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 30.xi.2011, Herb.: Anon.

Pluteus romellii

Parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, 30.xi.2011, Herb.: Anon.

Schizophyllaceae

Schizophyllum amplum

Salix, wood, dead, woodland and scrub, Site: Railway Fields, TQ316881, Middlesex, Col.: K. Mottram, Det.: K. Mottram, 30.xi.2011, Herb.: E.G.D. Tuddenham.

Strophariaceae

Psilocybe cyanescens

Wood, dead, parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, 30.xi.2011, Herb.: K. Mottram.

Tricholomataceae

Clitocybe fragrans

Wood, dead, parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: K. Mottram, Det.: K. Mottram, 30.xi.2011, Herb.: Anon.

Clitocybe geotropa

Leaf, fallen, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 30.x.2011, Herb.: Anon.

Clitocybe nebularis

Woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: M. Spencer, Conf.: K. Mottram, 30.x.2011, Herb.: Anon.

Hygrocybe virginea

Grassland and scrub, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 30.xi.2011, Herb.: E.G.D. Tuddenham.

Lyophyllum decastes

Soil, woodland and scrub, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 30.xi.2011, Herb.: E.G.D. Tuddenham.

Mycena crocata

Woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: M. Spencer, Conf.: K. Mottram, 30.x.2011, Herb.: Anon.

Mycena epipterygia* var. *epipterygia

As *Mycena epipterygia* var. *epipterigioides*, parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 30.xi.2011, Herb.: Anon.

Mycena inclinata

Woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: M. Spencer, Conf.: K. Mottram, 30.x.2011, Herb.: Anon.

Mycena leptocephala

Wood, dead, grassland and scrub, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: K. Mottram, 30.xi.2011, Herb.: Anon.

Wood, dead, parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: H. Thomas, 30.xi.2011, Herb.: Anon.

Mycena pura* var. *rosea

As *Mycena rosea*, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: M. Spencer, Conf.: K. Mottram, 30.x.2011, Herb.: Anon.

Panellus stipticus

Woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: M. Spencer, Conf.: K. Mottram, 30.x.2011, Herb.: Anon.

Rhodotus palmatus

Woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: M. Spencer, Conf.: K. Mottram, 30.x.2011, Herb.: Anon.

Tricholoma populinum

Populus alba, wall/path, parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: E. Taylor, Det.: K. Mottram, Conf.: P. Cavanagh, 10.ix.2011.

AURICULARIALES

Auriculariaceae

Auricularia auricula-judae

Sambucus nigra, wood, dead, woodland and scrub, Site: Railway Fields, TQ316881, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 30.xi.2011, Herb.: E.G.D. Tuddenham.

BOLETALES

Boletaceae

Boletus satanoides

As *Boletus legaliae*, *Quercus robur*, soil, parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: E.G.D. Tuddenham, Det.: E.G.D. Tuddenham, Conf.: A. Overall, 15.ix.2011.

Leccinum duriusculum

Wood, dead, parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: K. Mottram, Det.: E.G.D. Tuddenham, 30.xi.2011, Herb.: E.G.D. Tuddenham.

Leccinum scabrum

Wood, dead, parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: K. Mottram, Det.: K. Mottram, 30.xi.2011, Herb.: Anon.

Sclerodermataceae

Scleroderma bovista

As *Scleroderma verrucosum* var. *bovista*, soil, woodland and scrub, Site: Railway Fields, TQ316881, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 30.xi.2011, Herb.: E.G.D. Tuddenham.

Scleroderma citrinum

Woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: M. Spencer, Conf.: K. Mottram, 30.x.2011, Herb.: Anon.

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Hymenochaetaceae

Phellinus igniarius

Woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: M. Spencer, Conf.: K. Mottram, 30.x.2011, Herb.: Anon.

POLYPORALES

Fomitopsidaceae

Piptoporus betulinus

Betula, wood, dead, parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: H. Thomas, 30.xi.2011, Herb.: Anon.

Ganodermataceae

Ganoderma applanatum

Wood, dead, woodland and scrub, Site: Railway Fields, TQ316881, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 30.xi.2011, Herb.: E.G.D. Tuddenham.

Ganoderma australe

Grassland and scrub, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: K. Mottram, 30.xi.2011, Herb.: E.G.D. Tuddenham.

Meripilaceae

Abortiporus biennis

Grassland and scrub, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: K. Mottram, 30.xi.2011, Herb.: E.G.D. Tuddenham.

Meruliaceae

Gloeoporus dichrous

Woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: M. Spencer, Conf.: K. Mottram, 30.x.2011, Herb.: Anon.

Polyporaceae

Laetiporus sulphureus

Woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: M. Spencer, Conf.: K. Mottram, 30.x.2011, Herb.: Anon.

Trametes gibbosa

Woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: M. Spencer, Conf.: K. Mottram, 30.x.2011, Herb.: Anon.

Trametes versicolor

Woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: M. Spencer, Conf.: K. Mottram, 30.x.2011, Herb.: Anon.

Wood, dead, parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, 30.xi.2011, Herb.: Anon.

RUSSULALES

Hericiaceae

Hericium coralloides

Fraxinus excelsior, wood, dead, grassland and scrub, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: N. Reynolds, Det.: E.G.D. Tuddenham, 30.xi.2011, Herb.: E.G.D. Tuddenham.

Russulaceae

Lactarius controversus

Populus, Site: Alexandra Park, TQ301901, Middlesex, Col.: E. Taylor, Det.: E.G.D. Tuddenham, 30.viii.2011.

Russula atropurpurea

Wood, dead, parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, 30.xi.2011, Herb.: Anon.

Russula nigricans

Woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: M. Spencer, Conf.: K. Mottram, 30.x.2011, Herb.: Anon.

Russula ochroleuca

Woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: M. Spencer, Conf.: K. Mottram, 30.x.2011, Herb.: Anon.

Russula velenovskyi

Parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 30.xi.2011, Herb.: Anon.

Stereaceae

Stereum hirsutum

Woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: M. Spencer, Conf.: K. Mottram, 30.x.2011, Herb.: Anon.

Stereum subtomentosum
Woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: M. Spencer, Conf.: K. Mottram, 30.x.2011, Herb.: Anon.

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Uredinales
Pucciniaceae

Puccinia brachypodii* var. *brachypodii
As *Puccinia brachypodii*, *Arrhenatherum elatius*, leaf, parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: B. Wurzell, Det.: B. Wurzell, 30.xi.2011, Herb.: Anon.

Puccinia graminis* subsp. *graminis
As *Puccinia graminis*, *Lolium perenne*, leaf, parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: B. Wurzell, Det.: B. Wurzell, 30.xi.2011, Herb.: Anon.

Uromyces rumicis
Rumex obtusifolius, leaf, parkland and scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: B. Wurzell, Det.: B. Wurzell, 30.xi.2011, Herb.: Anon.

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MYXOMYCETES
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Reticulariaceae

Lycogala epidendrum
Woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: M. Spencer, Conf.: K. Mottram, 30.x.2011, Herb.: Anon.

86 records, 75 species.

Site references

Alexandra Park, TQ301901, Middlesex
Queen's Wood, TQ288886, Middlesex
Railway Fields, TQ316881, Middlesex
Tottenham Cemetery, TQ332909, Middlesex

People references

A. Overall
Anon.
B. Wurzell
E. Taylor
E.G.D. Tuddenham
H. Thomas
K. Mottram
M. Spencer
N. Reynolds
P. Cavanagh

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Amanita citrina var. *citrina* – Basidiomycota, Basidiomycetes, Agaricales, Pluteaceae.

Amanita muscaria – Basidiomycota, Basidiomycetes, Agaricales, Pluteaceae.

Armillaria gallica – Basidiomycota, Basidiomycetes, Agaricales, Marasmiaceae.

Auricularia auricula-judae – Basidiomycota, Basidiomycetes, Auriculariales, Auriculariaceae.

Boletus legaliae – (= *Boletus satanoides*), Basidiomycota, Basidiomycetes, Boletales, Boletaceae.

Boletus satanoides – Basidiomycota, Basidiomycetes, Boletales, Boletaceae.

Clitocybe fragrans – Basidiomycota, Basidiomycetes, Agaricales, Tricholomataceae.

Clitocybe geotropa – Basidiomycota, Basidiomycetes, Agaricales, Tricholomataceae.

Clitocybe nebularis – Basidiomycota, Basidiomycetes, Agaricales, Tricholomataceae.

Coprinus atramentarius – Basidiomycota, Basidiomycetes, Agaricales, Coprinaceae.

Coprinus comatus – Basidiomycota, Basidiomycetes, Agaricales, Coprinaceae.

Daldinia concentrica – Ascomycota, Ascomycetes, Xylariales, Xylariaceae.

Erisyphae dipsoaceae – (= *Erisyphe dipsoaceae*).

Erisyphae gallipsidis – (= *Erisyphe gallipsidis*).

Erisyphe dipsoaceae –

Erisyphe gallipsidis –

Erysiphe cichoracearum – (= *Erysiphe cichoracearum* var. *cichoracearum*), Ascomycota, Ascomycetes, Erysiphales, Erysiphaceae.

Erysiphe cichoracearum var. *cichoracearum* – Ascomycota, Ascomycetes, Erysiphales, Erysiphaceae.

Erysiphe cruciferarum – Ascomycota, Ascomycetes, Erysiphales, Erysiphaceae.

Erysiphe sordida – Ascomycota, Ascomycetes, Erysiphales, Erysiphaceae.

Erysiphe trifolii – (= *Microsphaera trifolii*), Ascomycota, Ascomycetes, Erysiphales, Erysiphaceae.

Ganoderma applanatum – Basidiomycota, Basidiomycetes, Polyporales, Ganodermataceae.

Ganoderma australe – Basidiomycota, Basidiomycetes, Polyporales, Ganodermataceae.

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Gymnopilus junonius – Basidiomycota, Basidiomycetes, Agaricales, Cortinariaceae.

Helvella crispa – Ascomycota, Ascomycetes, Pezizales, Helvellaceae.

Hericium coralloides – Basidiomycota, Basidiomycetes, Russulales, Hericiaceae.

Hygrocybe virginea – Basidiomycota, Basidiomycetes, Agaricales, Tricholomataceae.

Hypoxylon fragiforme – Ascomycota, Ascomycetes, Xylariales, Xylariaceae.

Inocybe geophylla – (= *Inocybe geophylla* var. *geophylla*), Basidiomycota, Basidiomycetes, Agaricales, Cortinariaceae.

Inocybe geophylla var. *geophylla* – Basidiomycota, Basidiomycetes, Agaricales, Cortinariaceae.

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Laccaria amethystina – Basidiomycota, Basidiomycetes, Agaricales, Hydnangiaceae.

Lactarius controversus – Basidiomycota, Basidiomycetes, Russulales, Russulaceae.

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Leccinum duriusculum – Basidiomycota, Basidiomycetes, Boletales, Boletaceae.

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Lycogala epidendrum – Myxomycota, Myxomycetes, Liceales, Reticulariaceae.

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Mycena epipterygia var. *epipterygia* – Basidiomycota, Basidiomycetes, Agaricales, Tricholomataceae.

Mycena inclinata – Basidiomycota, Basidiomycetes, Agaricales, Tricholomataceae.

Mycena leptocephala – Basidiomycota, Basidiomycetes, Agaricales, Tricholomataceae.

Mycena pura var. *rosea* – Basidiomycota, Basidiomycetes, Agaricales, Tricholomataceae.

Mycena rosea – (= *Mycena pura* var. *rosea*), Basidiomycota, Basidiomycetes, Agaricales, Tricholomataceae.

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Phellinus igniarius – Basidiomycota, Basidiomycetes, Hymenochaetales, Hymenochaetaceae.

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Phylactinia fraxini –

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Psathyrella multipedata – Basidiomycota, Basidiomycetes, Agaricales, Coprinaceae.

Psathyrella piluliformis – Basidiomycota, Basidiomycetes, Agaricales, Coprinaceae.

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Puccinia brachypodii – (= *Puccinia brachypodii* var. *brachypodii*), Basidiomycota, Urediniomycetes, Uredinales, Pucciniaceae.

Puccinia brachypodii var. *brachypodii* – Basidiomycota, Urediniomycetes, Uredinales, Pucciniaceae.

Puccinia graminis – (= *Puccinia graminis* subsp. *graminis*), Basidiomycota, Urediniomycetes, Uredinales, Pucciniaceae.

Puccinia graminis subsp. *graminis* – Basidiomycota, Urediniomycetes, Uredinales, Pucciniaceae.

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Russula nigricans – Basidiomycota, Basidiomycetes, Russulales, Russulaceae.

Russula ochroleuca – Basidiomycota, Basidiomycetes, Russulales, Russulaceae.

Russula velenovskyi – Basidiomycota, Basidiomycetes, Russulales, Russulaceae.

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Sawadaea tulasnei – Ascomycota, Ascomycetes, Erysiphales, Erysiphaceae.

Schizophyllum amplum – Basidiomycota, Basidiomycetes, Agaricales, Schizophyllaceae.

Scleroderma bovista – Basidiomycota, Basidiomycetes, Boletales, Sclerodermataceae.

Scleroderma citrinum – Basidiomycota, Basidiomycetes, Boletales, Sclerodermataceae.

Scleroderma verrucosum var. *bovista* – (= *Scleroderma bovista*), Basidiomycota, Basidiomycetes, Boletales, Sclerodermataceae.

Stereum hirsutum – Basidiomycota, Basidiomycetes, Russulales, Stereaceae.

Stereum subtomentosum – Basidiomycota, Basidiomycetes, Russulales, Stereaceae.

Trametes gibbosa – Basidiomycota, Basidiomycetes, Polyporales, Polyporaceae.

Trametes versicolor – Basidiomycota, Basidiomycetes, Polyporales, Polyporaceae.

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Acer pseudoplatanus
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Populus
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Tricholoma populinum.

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Rumex obtusifolius
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Senecio squalidus
Puccinia leginophorae.

Sinapis arvensis
Erysiphe cruciferarum.

Book review

Silent Spring revisited. Conor Mark Jameson. Bloomsbury Publishing, London. 2012. 288 pp. Hardback £16.99, eBook £16.99. ISBN: (print) 978 1 4081 5760 2, (e-pdf) 978 1 4081 5759 6, (ePub) 978 1 4081 5761 9.

I am not clear what sort of book this is meant to be. The title is clearly intended to indicate the basic theme. *Silent Spring,* published in 1962 by Rachel Carson, hit the public imagination, particularly in America, about the detrimental effects of pesticides, notably DDT on birds.

This book deals with the decades from the sixties through to the twenty-first century. This is in no way a textbook on conservation events during this period. It is more in the form of a diary, and a very personal one at that. This makes for a curious mix, but with some interesting findings for the naturalist; such as the one calling corncrake left in Northern Ireland falling silent in 1994, and the account of the GM food debate in 1999. But many bits seem whimsical. Why, for instance, does the 1972 entry start 'Ugandan President Obote was unseated in a military coup, and Idi Amin took control of the country.'? This is followed by a bit about the author's mother's love of wildflowers, butterflies and birds. It does expand to the fact that she enrolled the author and his siblings in the Young Ornithologists' Club. Ah! Perhaps we are getting there. 'The volunteers who guarded the famous osprey nest at Loch Garten in the Scottish Highlands operated out of a Bedford Dormobile' — but then back to the family again — '*just like the one my family had*'. This is followed by mention that a relation working for Tesco, with its office in Reading (there is more like this, even that Chi-Chi the panda at London Zoo had died, but I hope you get the picture). It only gradually emerges that the author worked for the RSPB, which naturally figures prominently in the text.

Things seem to get a little more focussed in later chapters. For 1988 we learn that The Common Agricultural Policy had its twenty-fifth birthday and that throughout its existence it had been the subject of reform, and a bit more detail about its effect on wildlife. Now that's more like it — but it doesn't last: 1989 starts with 'The old year ended and the new one began with me in panto. I'd taken a job as a stage technician at . . . '. For 2002 a resurvey of breeding waders on wet meadows is mentioned, in which just three snipe in all of the East Midlands were found, followed by climate talks at the Kyoto Summit. But then we have thrown in 'A quarter of a century after his death, Elvis Presley occupied the number one slot for a month this summer . . . '. Well really, what is this book about! I suppose it is attempting to put the conservation and environmental matters in their contemporary scene. This is a pity since it distracts from these issues, which are dealt with, but perhaps in a too journalistic manner.

A most odd feature is that the author spends the first few pages discussing a book, *The Peregrine,* published in 1967 by J. A. Baker, based on observations made in Essex over a decade from the mid fifties. He casts strong doubt about these observations — OK, but why mention them? Particularly since he comes back to Baker in the postscript where he seems to accept them after all.

This is a curiously mixed (up) book, but probably a good read for the general reader, and naturalists will surely find some interesting information.

Colin Bowlt

Botany report for 2011

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Abstract

This report details interesting or significant vascular plant records from within the LNHS recording area polygon for 2011.

Introduction

Once again, thank you to all of you who have contributed records for this report or who are participating in the London Flora Project. Although I make efforts to verify all information reported, it is inevitable that some errors will occur; in particular, please notify me if you are aware of identification, grid reference or location detail errors.

CHAROPHYTES

Even common charophytes tend to be very under-recorded so I was very pleased to receive George Hounsome's (tentative) record of *Nitella flexilis* from the bank of Summerhouse Lake in Bentley Priory Nature Reserve (vc 21: TQ155925) on the LNHS Botany Section meeting led by David Bevan on 16 July to Harrow Weald Common and Bentley Priory (*LNHS Newsletter* No. 223: 13).

FERNS AND ALLIES

Equisetaceae

Equisetum fluviatile **water horsetail** was recorded, accompanied by *Veronica beccabunga* **brooklime**, *Mentha aquatica* **water mint** and *Myosotis scorpioides* **water forget-me-not** from a damp ditch in Whitewebbs Wood (vc 21: TQ3299) on the LNHS Botany Section meeting led by Robin Blades on 30 April to Whitewebbs Park (*LNHS Newsletter* No. 223: 10–11). *Equisetum sylvaticum* **wood horsetail** was recorded to the east of Grim's Dyke Hotel (vc 21: TQ145929) on the LNHS Botany Section meeting led by David Bevan on 16 July to Harrow Weald Common and Bentley Priory (*LNHS Newsletter* No. 223: 12). In recent decades this plant has otherwise only been recorded in Middlesex from Kenwood, Hampstead Heath where it now appears to be extinct; nevertheless, it may turn up elsewhere (as a recent and as yet to be verified record indicates). *Equisetum telmateia* **great horsetail** was recorded alongside a drainage ditch north of Summerhouse Lake in Bentley Priory Nature Reserve (vc 21: TQ154928) on the LNHS Botany Section meeting led by David Bevan on 16 July to Harrow Weald Common and Bentley Priory (*LNHS Newsletter* No. 223: 13).

Pteridiaceae

Fred Rumsey recorded a single plant of the regionally non-native *Adiantum capillus-veneris* **maidenhair-fern** from a railway bridge arch at Upper Marsh, Waterloo (vc 17: TQ3095579566) on 25 July. He also recorded *Pteris cretica* **Cretan brake** from nearby at Juxon Street (vc 17: TQ3084778946) and a railway bridge near the junction of Lambeth Road with Hercules Road (vc 17: TQ3090779089), the latter location is a well-known colony that was first recorded by Nick Bertrand. Fred also found Cretan brake at Welbeck Street (vc 21:TQ2881).

Aspleniaceae

Asplenium adiantum-nigrum **black spleenwort** and *A. trichomanes* **maidenhair spleenwort** were recorded from the north-east section of London Zoo (vc 17: TQ2883) on the LNHS Botany Section meeting hosted by Sven Seiffert on 28 August (*LNHS Newsletter* No. 223: 16). Both species were also found in Acton Park (vc 21:TQ2080) on 12 March during an LNHS Botany Section meeting. Maidenhair spleenwort was also recorded from St Mary's Church, Harefield (vc 21: TQ053896) on 30 April and from Doric Way, Camden (vc 21: TQ297828) on 18 September by Clive and Helen Schofield. *Asplenium ruta-muraria* **wall-rue** was recorded (vc 18: TQ5678) during the LNHS Botany Section meeting led by Mary Smith on 18 June to Purfleet (*LNHS Newsletter* No. 222: 15); this species is rare in the area and was therefore a good find according to Mary. This species was also found in Acton Park (vc 21:TQ2080) on 12 March during an LNHS Botany Section meeting and near Wormholt Park (vc 21: TQ2280) on 10 April during another LNHS Botany Section meeting. Finally, Clive and Helen Schofield recorded wall-rue from St John's Church, Hillingdon (vc 21:TQ068828) on 30 April.

John Edgington made an exceptional discovery in 2011; in May he found a single well-established clump with approximately thirty fronds of *Asplenium septentrionale* **forked spleenwort** growing at the base of railings on the junction of lead flashing above a basement in Welbeck Street (vc 21:TQ2881); nearby was found single plant of wall-rue. This plant of forked spleenwort is a great distance from its nearest typical UK locations, namely Devon, Somerset and north Wales; the only other extant south-east England locality is the one rediscovered, in 2007, by John Edgington (Edgington 2008) on a bridge in Romney Marsh (vc 15:TR008271).

Blechnaceae

In my last two reports (Spencer 2010: 130; 2011: 237) I referred to two records for *Blechnum spicant* **hard-fern,** one by John Dobson from Stanmore Country Park (vc 21: TQ157941) and the other by Howard Matthews from Harrow Weald Common in 2008. First, I must correct errors I made (Spencer 2011) where I wrote 'Stanmore Country Park', I should have written 'Stanmore Common'. Secondly, participants in the LNHS Botany Section meeting led by David Bevan on 16 July to Harrow Weald Common and Bentley Priory (*LNHS Newsletter* No. 223: 12) were unable to re-record hard-fern from the site. Gordon Tranter also recorded a single plant of hard-fern from Copse Wood, Ruislip Woods National Nature Reserve (vc 21: TQ08299032) on 10 January.

Dryopteridaceae

A few plants of *Dryopteris carthusiana* **narrow buckler-fern** were recorded to the east of Grim's Dyke Hotel (vc 21:TQ1492) on the LNHS Botany Section meeting led by David Bevan on 16 July to Harrow Weald Common and Bentley Priory (*LNHS Newsletter* No. 223: 12). Whilst visiting the forked spleenwort site (vc 21: TQ2881), Fred Rumsey recorded *Polystichum tsus-simense* (probably var. *mayebarae*) nearby.

A single plant of *Polystichum aculeatum* **hard shield-fern** was recorded from the south-western corner of Summerhouse Lake in Bentley Priory Nature Reserve (vc 21: TQ155925) on the LNHS Botany Section meeting led by David Bevan on 16 July to Harrow Weald Common and Bentley Priory (*LNHS Newsletter* No. 223: 13). As I mentioned in my previous report (Spencer 2011: 237), *Polystichum setiferum* **soft shield-fern** appears to be spreading rapidly in the London Area, mainly from nearby plantings. It was recorded from the same locality in Bentley Priory Nature Reserve (vc 21: TQ155925) as hard shield-fern during the LNHS Botany Section meeting led by David Bevan on 16 July to Harrow Weald Common and Bentley Priory (*LNHS Newsletter* No. 223: 13), in this locality it was growing with a relict of cultivation, *Epimedium* × *versicolor* a **barren-wort**. A putative *Polystichum* × *bicknellii* (*P. aculeatum* × *P. setiferum*) **Bicknell's shield-fern** was recorded from Whitewebbs Wood (vc 21: TQ3299) on the LNHS Botany Section meeting led by Robin Blades on 30 April to Whitewebbs Park (*LNHS Newsletter* No. 223: 10); it was finally determined as *P. aculeatum* **hard shield-fern** after examination of mature material by Howard Matthews and Fred Rumsey.

GYMNOSPERMS – CONIFERS

Araucariaceae

A single seedling of *Araucaria araucana* **monkey-puzzle** was recorded by Stephen Middleton from the north-west portion of Coldfall Wood, Haringey (vc 21: TQ2749590454). The nearest likely parent plants are in the adjoining St Pancras and Islington Cemetery where quite a few mature trees can be seen with cones on them. This is the first record of a self-sown seedling in Middlesex.

FLOWERING PLANTS – PRE-DICOTS

Aristolochiaceae

Arisarum proboscideum **mouse-tail plant** was recorded to the east of Grim's Dyke Hotel (vc 21: TQ142928) on the LNHS Botany Section meeting led by David Bevan on 16 July to Harrow Weald Common and Bentley Priory (*LNHS Newsletter* No. 223: 12; see also Spencer 2010: 119). The *LNHS Newsletter* is slightly in error as the plant was discovered by Rodney Burton in 1983 and not by David Bevan and Rodney Burton in 1989 (Kent 2000: 70; BSBI Distribution Database website, sourced 11 August 2012).

FLOWERING PLANTS – EUDICOTYLEDONS

Papaveraceae

In one of the early years of the last decade I was employed to survey Bexley as part of the much-lamented (by me anyway!) GLA habitat survey. During that time, I was most disappointed not to find *Ceratocapnos claviculata* **climbing corydalis**; on 9 July, Chris Rose was able to confirm that the plant is still present in the borough, at Bursted Woods (vc 16: TQ4971376427). Incidentally, the casual plants I recorded from Islington in 2007 (Spencer 2008: 183) failed to persist, largely due to some unusually attentive weeding on the part of the council contractors!

Fumaria muralis ssp. *boroei* **common ramping-fumitory** is far from frequent in the London Area; Clive and Helen Schofield recorded it from the Royal Botanic Gardens, Kew (vc 17: TQ178765) on 25 April. In my last report, I somehow omitted to mention George Hounsome's 2010 discovery of *Fumaria reuteri* **Martin's ramping-fumitory** from Virginia Water Station (vc 17: TQ 00106795); this was apparently the first record from Surrey since the late 1950s. Early in October 2011, I visited Virginia Water to attend a meeting and had a very pleasurable surprise (as I'd completely forgotten about it!) to see *F. reuteri* flowering profusely in a flowerbed, I've since learned from George that he has become the colony's unofficial carer.

Several plants of *Pseudofumaria alba* **pale corydalis** were found growing on low garden walls in Campden Hill Square (vc 21: TQ249802) on the LNHS Botany Section meeting led by myself on 18 May (*LNHS Newsletter* No. 222: 18); it is odd that this species does not seem anywhere as willing as its close relative *P. lutea* **yellow corydalis** to spread far and wide; perhaps it needs more time?

Ranunculaceae

On 3 March, Mary Smith found two small plants of *Helleborus foetidus* **stinking hellebore** in the bottom of an old chalk pit at Purfleet (vc. 18: TQ5578) growing in 'light woodland comprising chiefly *Cornus sanguinea*, *Ligustrum vulgare*, *Betula pendula* and *Clematis vitalba*'. After discussion with Ken Adams, the Essex vice-county recorder, Mary concluded that the plants are most likely garden escapes but may be native.

Ranunculus flammula **lesser spearwort** is generally a common and widespread plant in the British Isles, not so in the urbanized parts of Greater London and particularly Middlesex where it has been quite some time since it was considered common (Kent 1975: 156; 2000: 162). A pool containing abundant lesser spearwort (vc 21: TQ146929) was recorded on the LNHS Botany Section meeting led by David Bevan on 16 July to Harrow Weald Common and Bentley Priory (*LNHS Newsletter* No. 223: 12).

Grossulariaceae

Ribes uva-crispa **gooseberry** was recorded from Whitewebbs Wood (vc 21: TQ3299) on the LNHS Botany Section meeting led by Robin Blades on 30 April to Whitewebbs Park (*LNHS Newsletter* No. 223: 10); six further records were received from various parts of urban Surrey, mainly courtesy of Ian Kitching: The Chase, Raynes Park (vc 17: TQ240694) on 2 April; Morden (vc 17: TQ269678) on 24 April; Merton Abbey Mills (vc 17: TQ2669); Nonsuch Park (vc 17: TQ234641) on 4 June; St Nicholas's Churchyard, Sutton (vc 17: TQ257642) and finally, via Clive and Helen Schofield, from the Thames towpath, Kew (vc 17: TQ183774) on 9 July.

Saxifragaceae

Although *Saxifraga tridactylites* **rue-leaved saxifrage** seems to be increasing in abundance in south London (Spencer 2011: 239) it remains a very scarce plant in Middlesex. Several plants were recorded from the northern edge of Wormholt Park (vc 21: TQ2280) during the LNHS section meeting on 10 April; it was also recorded from on top of a wall at Avondale Park (vc 21: TQ240850) on the LNHS Botany Section meeting led by myself on 18 May (*LNHS Newsletter* No. 222: 18). Clive and Helen Schofield recorded it from Polygon Road, Camden (vc 21: TQ296831) on 27 April. Both John Edgington and I also noted large quantities in the car park next door to Mount Pleasant Sorting Office (vc 21: 309821) in 2011. In Surrey, Ian Kitching e-mailed me and others to say that on 12 April on his way home he 'looked out of the window of the Tube as it approached platforms 3/4 at Wimbledon Station [vc 17: TQ248709] to see masses of *Saxifraga tridactylites* in the cracks in the platform (where it seems to be ousting the *Arabidopsis*)'. In response, on 13 April, Dave Dawson commented that 'I think that it may be increasing in SW London, as I have found it abundant in two separate, but small, areas in TQ2876 (Battersea Fields, Queenstown Road) in the last week'.

Tellima grandiflora **fringecups** was recorded three times in Surrey during 2011; first, on 24 April, by Clive and Helen Schofield in the conservation area at the Royal Botanic Gardens, Kew (vc 17: TQ178765) and then by Ian Kitching on 4 May from Nonsuch Park (vc 17: TQ233642) and Mitcham (vc 17: TQ283691) on 8 May.

Crassulaceae

A very small patch of the non-native garden escape *Sedum rupestre* **reflexed stone-crop** was recorded from a meadow at Warren Farm just south of Nonsuch Park (vc 17: TQ2362) during the LNHS Botany Section meeting on 25 June (*LNHS Newsletter* No. 222: 16).

Fabaceae

Seedlings of *Acacia dealbata* **silver wattle** were found germinating in a lawn at Mount Street Gardens (vc 21: TQ2880) on the LNHS Botany Section meeting led by myself on 13 August in Mayfair; no doubt they will be mown and not persist but this does indicate the capacity for this species to become established here.

Astragalus glycyphyllos **wild liquorice** was recorded from a new locality, a small chalky bank near Watts Wood (vc 18: TQ5678) during the LNHS Botany Section meeting led by Mary Smith on 18 June to Purfleet (*LNHS Newsletter* No. 222: 15).

Medicago arabica **spotted medick** was recorded (*LNHS Newsletter* No. 221: 15) on the LNHS Botany Section meeting to the Isle of Dogs in Millwall Park (vc 21: TQ382784) led by John Swindells on 26 February. Athough this species is now quite widespread across much of the London Area, it is always worthwhile checking the vegetation for other, rarer *Medicago* or *Trifolium* species if this is present; it is quite a good 'indicator' species, although considerably more tolerant of nutrient-rich environments than more 'choice' species. Also, beware, sometimes spotted medick can be unspotted and thus confused with species such as *M. polymorpha* **toothed medick** — it is always wise to check the stipules and fruit (if available) in such cases. Toothed medick was recorded by John Archer from Swedenborg Gardens (vc 21: TQ343807); this is the first recent record of this species in Middlesex, although I suspect it's under-recorded. Juliet Cairns also recorded it from Blackheath; this is a very interesting record and may well be the first one since the early part of the ninteenth century (Burton 1983: 54).

Ornithopus perpusillus **bird's-foot** is now very rare in Middlesex and usually only found in the south-west around Hampton Court and Bushy Park; therefore, it was very pleasing to find some plants in short mown grass at Acton Park (vc 21: TQ2074780269) during the LNHS Botany Section meeting on 12 March.

Trifolium arvense **hare's-foot clover** was recorded from an area of rough grassland in the north-east section of London Zoo (vc 17: TQ2883) on the LNHS Botany Section meeting hosted by Sven Seiffert on 28 August (*LNHS Newsletter* No. 223: 17). Mavis Pilbeam discovered *Trifolium ornithopodioides* **bird's-foot clover** at the base of a tree in Station Road, Islington (vc 21: TQ2986); this is the first record in Middlesex since 1986 (Kent 2000: 195) and then only as probable introduction, it has probably been over a hundred years since the plant was native in the vice-county. Chris Rose reported that 'Mike Neale and Tristan of LACV' found several plants of bird's-foot clover on 26 June in a heathland area with bare patches by the edge of a path at Lesnes Abbey Woods (vc 16: TQ4847878604); their discovery was confirmed by him. In Middlesex, *Trifolium striatum* **knotted clover**, is now rare and usually only found in the Hampton Court or Staines areas; thus, finding it alongside bird's-foot (vc 21: TQ2074780269) during the LNHS Botany Section meeting on 12 March was very satisfying. Dave Dawson also found it on 4 June in waste ground at Nine Elms Lane (vc 17: TQ29457753). Clive and Helen Schofield found *Trifolium subterraneum* **subterranean clover** in a lawn near the White Peaks Café, Royal Botanic Gardens, Kew (vc 17: TQ185771) on 25 April and Chris Rose found 'lots' between a hedge and ball court at Barnehurst Golf Course (vc 16: TQ5122275801) on 23 June.

Dave Dawson recorded *Vicia lutea* **yellow vetch** from Wandle Meadow Nature Park, Colliers Wood (vc 17: TQ26487085) on 10 September. This is a most interesting record for this nationally scarce plant and not too far from the last Wimbledon Record (vc 17: TQ215715) made in 1991 (BSBI Distribution Database website, sourced 27 August 2012); Dave has retained a voucher that I look forward to seeing at some point in the future.

Rosaceae

Young plants of *Cotoneaster wardii* **Ward's cotoneaster** were recorded from a wall on St John's Gardens (vc 21: TQ244805) on the LNHS Botany Section meeting led by myself on 18 May (*LNHS Newsletter* No. 222: 18), in the company of the cotoneaster were *Leycesteria formosa* **Himalayan honeysuckle** and *Deutzia scabra* **deutzia**. Ian Kitching recorded three other species of cotoneaster that are probably under-recorded in the London Area: *Cotoneaster rehderi* **bullate cotoneaster** from St Nicholas's churchyard, Sutton (vc 17: TQ257642) on 9 July; *Cotoneaster hjelmqvistii* **Hjelmquist's cotoneaster** from Fairland's Park, Cheam (vc 17: TQ238652) on 4 May and *Cotoneaster sternianus* **Stern's cotoneaster** from Nonsuch Park (vc 17: TQ227639) on 6 May.

Potentilla anglica **trailing tormentil** was recorded from tree-cleared areas in Bentley Priory (vc 21) on the LNHS Botany Section meeting led by David Bevan on 16 July to Harrow Weald Common and Bentley Priory (*LNHS Newsletter* No. 223: 13). I must confess to being a bit dubious of this record; I have only once found *P. anglica* in London, admittedly nearby at Stanmore

Country Park (vc 21: TQ17469340) and very frequently find either *P.* × *italica* (*P. erecta* × *P. reptans*) or *P.* × *mixta* (*P. anglica* × *reptans*). My suspicion regarding this record was increased further on receiving a record, dated 21 August, from Clive and Helen Schofield for *P. mixta* from Bentley Priory (TQ157932). All three taxa are tetramerous or pentamerous (4–5 petalled) and identification should be based upon vegetative morphology and fruit fertility as well as petal number (Stace 2010: 253, 256-257); as Stace points out, separating the hybrid taxa can be extremely difficult!

Following up on the LNHS Botany Section meeting led by myself on 13 August in Mayfair, John Edgington discovered *Potentilla* (formerly *Duchesnea indica*) *indica* **yellow-flowered strawberry** growing in mown grass at Berkeley Square (vc 21: TQ2880) on 5 September. Chris Rose recorded yellow-flowered strawberry from Mornington Place and Clarkson Row in Camden where Aaron Woods had reported this plant in 2007 (Spencer 2008: 188); he also recorded it from near the River Shuttle, Bexley Wood (vc 16: TQ4832073816) on 7 July. Aaron Woods found *Potentilla sterilis* **barren strawberry** in St Pancras & Islington Cemeteries (vc 21: TQ2690) on 20 March; again, this is now a scarce plant in Middlesex and recent records would be welcomed.

A seedling of *Prunus persica* **peach**, presumably discarded after mealtime, was recorded from underneath a London plane tree in the south-east section of London Zoo (vc 17: TQ2883) on the LNHS Botany Section meeting hosted by Sven Seiffert on 29 May (*LNHS Newsletter* No. 222: 10).

Numerous mature and semi-mature *Prunus serrulata* **Japanese cherry** were recorded in woodland south of Memorial Ride (vc 17: TQ231713) on the LNHS Botany Section meeting led by Dave Dawson on 27 March to Wimbledon Common (*LNHS Newsletter* No. 221: 17); although there was some debate about its identity at the time this was confirmed later and a voucher deposited at the Natural History Museum. This was the first time I've seen this species fully naturalized and regenerating in the London Area. The same species was also recorded from Whitewebbs Wood (vc 21: TQ3299) on the LNHS Botany Section meeting led by Robin Blades on 30 April to Whitewebbs Park (*LNHS Newsletter* No. 223: 10).

Approximately twelve trees, of varying ages, of *Sorbus domestica* **service tree** were reported from Tottenham Marshes via Nick Barber (Chairman of the Friends of Tottenham Marshes); Nick could find no evidence of planting and thought it likely that the trees were bird dispered from a mature tree at St Anne's Hospital approximately two miles away. Two young trees of, out of an apparent total of four, *Sorbus torminalis* **service tree** were recorded in Whitewebbs Wood (vc 21: TQ3299) on the LNHS Botany Section meeting led by Robin Blades on 30 April to Whitewebbs Park (*LNHS Newsletter* No. 223: 11).

Urticaceae

A new colony of **membranous nettle** *Urtica membranacea* turned up at another Greater London site (see Spencer 2010: 129–130; 2011: 240–241 for previous records); David Bevan found a colony on Brownlow Road near Bounds Green (vc 21: TQ30009147).

Juglandaceae

A single sapling of *Pterocarya fraxinifolia* **Caucasian wingnut** was recorded from the north-east section of London Zoo (vc 17: TQ2883) on the LNHS

Botany Section meeting hosted by Sven Seiffert on 28 August (*LNHS Newsletter* No. 223: 16). This occurrence is unusual as all records that I am aware of to date in the London Area are derived from suckers from planted trees.

Betulaceae

A single sapling of *Alnus cordata* **Italian alder** was recorded from the north-east section of London Zoo (vc 17: TQ2883) on the LNHS Botany Section meeting hosted by Sven Seiffert on 28 August (*LNHS Newsletter* No. 223: 16). This species is now a very popular street tree and seedlings are becoming increasingly frequent, particularly in canal and dockside walls.

Euphorbiaceae

Euphorbia amygdaloides (presumably ssp. *amygdaloides*) **wood spurge** was recorded from Watts Wood (vc 18: TQ5678), an ancient semi-natural woodland, during the LNHS Botany Section meeting led by Mary Smith on 18 June to Purfleet (*LNHS Newsletter* No. 222: 15). *Euphorbia characias* ssp. *veneta* (formerly ssp. *wulfenii*) **Mediterranean spurge** was recorded as a possibly self-sown plant on Parkside Gardens (vc 17: TQ237715) on the LNHS Botany Section meeting led by Dave Dawson on 27 March to Wimbledon Common (*LNHS Newsletter* No. 221: 17; Spencer 2011: 241). It was also found in Acton Park (vc 21: TQ2080) on 12 March during an LNHS Botany Section meeting. On 1 September, David Nicolle recorded over thirty plants of *Euphorbia maculata* **spotted spurge** growing around the base of two rows of box in Tower Gardens (Trinity Square Gardens), Tower Hamlets (vc 21: TQ334807). I've mentioned in my two last reports (Spencer 2010: 122; 2011: 241) that *Euphorbia oblongata* **Balkan spurge** seems to be increasing. On 24 August Ian Kitching found a well-established colony, probably of planted origin, on the site of a 'long-demolished pavilion' at Cannon Hill Common, Raynes Park (vc 17: TQ239683).

Hypericaceae

Hypericum humifusum **trailing St John's-wort** was recorded from the south side of the lake, Lamorbey Park, Sidcup (vc 16: TQ4673473111) by Chris Rose on 27 July. *Hypericum tetrapterum* **square-stalked St John's-wort** was recorded by a small pond in Whitewebbs Wood (vc 21: TQ3299) on the LNHS Botany Section meeting led by Robin Blades on 30 April to Whitewebbs Park (*LNHS Newsletter* No. 223: 10). This species was also recorded from the entrance to Watts Wood (vc 18: TQ567789), an ancient semi-natural woodland, during the LNHS Botany Section meeting led by Mary Smith on 18 June to Purfleet (*LNHS Newsletter* No. 222: 15), and Chris Rose found it at Thames Road Wetland, Crayford (vc 16: TQ5277575212) on 21 July.

Geraniaceae

Erodium moschatum **musk storks-bill** was recorded (*LNHS Newsletter* No. 221: 15) on the LNHS Botany Section meeting to the Isle of Dogs in Millwall Park (vc 21: TQ382784) led by John Swindells on 26 February. This species is certainly very uncommon in Middlesex but can be found regularly in Mile End Park and around Hampton; it is rather more widespread in Surrey where Ian Kitching recorded it from the following locations: Mitcham (vc 17: TQ266688

& TQ284686) on 2 April and 11 September; New Malden (vc 17: TQ210693) on 17 April; John Innes Park, Merton (vc 17: TQ248694) on 4 June; Sutton (vc 17: TQ243643) on 23 July and finally, Beddington Lane (vc 17: TQ293672) on 3 December.

Onagraceae

Seedlings of *Gaura lindheimeri* **Lindheimer's beeblossom** were recorded scattered in neglected flowerbeds in Avondale Park (vc 21: TQ240850) on the LNHS Botany Section meeting led by myself on 18 May (*LNHS Newsletter* No. 222: 18). This would appear to be the first British record for this popular garden plant.

Sapindaceae

A sapling of *Aesculus indica* **Indian horse-chestnut** was recorded from the south-east section of London Zoo (vc 17: TQ2883) on the LNHS Botany Section meeting hosted by Sven Seiffert on 29 May (*LNHS Newsletter* No. 222: 10); shortly after, Ian Kitching found three apparently self-sown saplings on Wimbledon Chase (vc 17: TQ245692) on 4 June.

It has been several years since I received any records for *Koelreuteria paniculata* **pride-of-India**; Ian Kitching made three records during 2011: numerous self-sown plants in flowerbeds, from seedlings to three-metre saplings at Nelson Gardens, Morden Hall Road, Merton (vc 17: TQ258697) on 22 May; a small sapling at the base of a wall in Sutton (vc 17: TQ250639) on 15 October and finally, many seedlings in a flowerbed derived from a nearby planted parent, Cheam (vc 17: TQ246639) on 15 October.

Brassicaceae

Cochlearia danica **Danish scurvy-grass** was recorded on the verge of Cannizaro Road (vc 17: TQ233709) on the LNHS Botany Section meeting led by Dave Dawson on 27 March to Wimbledon Common (*LNHS Newsletter* No. 221: 17). Alongside the scurvy-grass were thousands of *Erophila verna* ssp. *verna* **common whitlow-grass**, this species was also recorded on the LNHS Botany Section meeting to the Isle of Dogs on the Thames Path (vc 21: TQ3878) led by John Swindells on 26 February. *C. danica* was also recorded from near Wormholt Park (vc 21: TQ2280) on 10 April during an LNHS Botany Section meeting; this species is most commonly noted from the major trunk roads and motorways on the outskirts of London, records from the inner boroughs and side roads remain more infrequent.

A single plant of *Descurainia sophia* **flixweed** was recorded by Ian Kitching from Morden Sports Ground (vc 17: TQ246679) on 29 June. In our area this species rarely seems to appear as anything other than singletons; Chris Rose found three plants on the east side of Gravel Hill Close, Bexleyheath (vc 16: TQ4987774315) on 4 July.

Rorippa palustris **marsh yellow-cress** was recorded from the north-east section of London Zoo (vc 17: TQ2883) on the LNHS Botany Section meeting hosted by Sven Seiffert on 28 August (*LNHS Newsletter* No. 223: 16).

Polygonaceae

Fallopia sachalinensis **giant knotweed** was recorded to the east of Grim's Dyke Hotel (vc 21: TQ144929) on the LNHS Botany Section meeting led by David

Bevan on 16 July to Harrow Weald Common and Bentley Priory (*LNHS Newsletter* No. 223: 12).

Ken Adams reported the recent discovery of *Persicaria mitis* **tasteless water-pepper** from Theydon Bois, Essex (vc 18: TQ4599) on 24 August; this would appear to be the first record in the county since the 1860s (BSBI Distribution Database website: sourced 27 August 2012).

Rumex maritimus **golden dock** was recorded by Chris Rose from the banks of the River Shuttle in Marlborough Park, Blackfen (vc 16: TQ4635973480) on 25 August.

Caryophyllaceae

Withered, relictual 'wildflower' seed-mix-derived plants of *Agrostemma githago* **corncockle** were recorded in the north-east section of London Zoo (vc 17: TQ2883) on the LNHS Botany Section meeting hosted by Sven Seiffert on 28 August (*LNHS Newsletter* No. 223: 16).

Herniaria glabra **smooth rupturewort** was recorded from the old tree nursery, Nonsuch Park (vc 17: TQ224632) during the LNHS Botany Section meeting on 25 June (*LNHS Newsletter* No. 222: 15); this colony is presumed to have arrived via nursery stock from East Anglia. Alongside it grew *Polypogon viridis* **water bent** and *Spergula rubra* **sand spurrey**.

Moehringia trinervia **three-nerved sandwort** was recorded from Whitewebbs Wood (vc 21: TQ3299) on the LNHS Botany Section meeting led by Robin Blades on 30 April to Whitewebbs Park (*LNHS Newsletter* No. 223: 10); it was also recorded during the LNHS Botany Section meeting (*LNHS Newsletter* No. 222: 15) led by Mary Smith on 18 June to Purfleet (vc 18: TQ5678). On 30 April, Clive and Helen Schofield found plants in the wood behind Harefield Church (vc 21: TQ056897), a famed site for *Tulipa sylvestris* **wild tulip** and *Cardamine bulbifera* **coralroot**. Three-nerved sandwort is now an uncommon plant in much of Middlesex and is largely restricted to ancient woodland habitats in the north and west; when found in more urbanized areas, particularly the inner London boroughs, accurate locations details (preferably with at least a 100-metre OS grid reference) are desirable.

Dave Dawson found *Polycarpon tetraphyllum* **four-leaved allseed** near Queenstown Road, Battersea (vc 17: TQ281760) on 27 September.

Stellaria alsine **bog stitchwort** was recorded at a poolside in Bentley Priory Nature Reserve (vc 21: TQ152930) on the LNHS Botany Section meeting led by David Bevan on 16 July to Harrow Weald Common and Bentley Priory (*LNHS Newsletter* No. 223: 13). *Stellaria pallida* **lesser chickweed** was recorded (*LNHS Newsletter* No. 221: 15) on the LNHS Botany Section meeting to the Isle of Dogs in Millwall Park (vc 21: TQ382784) led by John Swindells on 26 February. This species was also recorded near Somerset Ride (vc 17: TQ2371) on the LNHS Botany Section meeting led by Dave Dawson on 27 March to Wimbledon Common (*LNHS Newsletter* No. 221: 17) and was also recorded, growing alongside *Poa infirma*, during the LNHS section meeting to Wormholt Park (vc 21: TQ2280) on 10 April. Ian Kitching also recorded it twice from Surrey: from Phipps Bridge Road (vc 17: TQ267688) on 2 April and from Ravensbury Park, Morden (vc 17: TQ268679) on 24 April.

Montiaceae

Claytonia perfoliata **spring-beauty** was recorded near Wimbledon Common War Memorial (vc 17: TQ236711) on the LNHS Botany Section meeting led by Dave Dawson on 27 March to Wimbledon Common (*LNHS Newsletter* No. 221: 17). This fairly widespread species was also recorded from: Bunhill Fields Burial Ground (vc 21: TQ3269282266) by Chris Rose on 8 February; Motspur Park (vc 17: TQ222673) by Ian Kitching on 19 March and from near Queen Charlotte's Cottage, Royal Botanic Gardens, Kew by Clive and Helen Schofield on 25 April.

As I mentioned in my previous report (Spencer 2011: 245), in the London Area *Montia fontana* **blinks** seems to be entirely represented by ssp. *chondrosperma* and it was this subspecies that was recorded in Whitewebbs Wood (vc 21: TQ3299) on the LNHS Botany Section meeting led by Robin Blades on 30 April to Whitewebbs Park (*LNHS Newsletter* No. 223: 11).

Hydrangeaceae

Deutzia scabra **deutzia**, see the entry for *Cotoneaster wardii*, **Rosaceae**.

Primulaceae

Cyclamen hederifolium **sowbread** was recorded just off Parkside Gardens (vc 17: TQ237715) on the LNHS Botany Section meeting led by Dave Dawson on 27 March to Wimbledon Common (*LNHS Newsletter* No. 221: 17).

The wild form of *Lysimachia nummularia* **creeping Jenny** was recorded by a small pond in Whitewebbs Wood (vc 21: TQ3299) on the LNHS Botany Section meeting led by Robin Blades on 30 April to Whitewebbs Park (*LNHS Newsletter* No. 223: 10).

Chris Rose found *Samolus valerandii* **brookweed** in two locations in West Kent in 2011; this was very pleasing to hear as I had feared that the plant had gone extinct in the London part of the vice-county. The first, at Thames Road Wetland, Crayford (vc 16: TQ5298675262 and TQ5293075235) contains good quantities of the plant although they tend to get grazed off by ponies; the second, just over the border into the modern administrative county of Kent is on the edge of Dartford Marshes (vc 16: TQ5324275643). Both sites are not far from where I last saw the plant on Crayford Marsh (vc 16: TQ535077720) in 2003. Incidentally, in 2010, Maggie Ellenby and I discovered a casual population of this plant, supported by a garden sprinkler system, in the grounds of flats at the site of the former New River Head, Rosebery Avenue (vc 21: TQ31328272).

Rubiaceae

David Nicolle recorded *Galium murale* **yellow wall bedstraw** growing 'in the patch of grass on the west side of the Roman wall', Tower Gardens (Trinity Square Gardens), Tower Hamlets (vc 21: TQ336807) on 1 September. Following my comments about *Galium verum* ssp. *wirtgenii* **ladies bedstraw** in my last report (Spencer 2011: 245) Ken Adams e-mailed me to say that the same plant 'seems to be all over the place in verge mixtures. e.g. [the] new Waltham Abbey Bypass — along with gigantic *Briza media*!'

Fred Rumsey discovered *Sherardia arvensis* **field madder** on 26 August in a lawn at Campbell Court, Gloucester Road (vc 21: 262709).

Gentianaceae

I received a record of *Gentianella amarella* ssp. *amarella* **autumn gentian** from Paul Goodman who 'found two small separate plants but there may be a few others' at Banstead Woods (vc 17: TQ267572). He had not seen them there before but commented that they 'are quite common nearby by a footpath at Park Down' (vc 17: TQ266584) where he has 'seen them every year for many years'.

Boraginaceae

In 2010, Juliet Cairns recorded *Amsinckia micrantha* **common fiddleneck** from Blackheath (Spencer 2011: 245); this year, 2011, on 8 May, Ian Kitching found it in Mitcham (vc 17: TQ280691). As yet, I don't recall any recent records for this plant from north of the river but I suspect it will arrive soon, as did Jersey cudweed.

Several plants of *Cerinthe major* **greater honeywort** were recorded in mown grass and nearby flowerbeds (*LNHS Newsletter* No. 221: 15) on the LNHS Botany Section meeting to the Isle of Dogs on Jubilee Crescent (vc 21: TQ383790) led by John Swindells on 26 February.

Echium pininana **giant viper's bugloss** was recorded (*LNHS Newsletter* No. 221: 15) on the LNHS Botany Section meeting to the Isle of Dogs on Manchester Road (vc 21: TQ383784) led by John Swindells on 26 February. *Echium vulgare* **viper's-bugloss** was recorded from an area of rough grassland in the north-east section of London Zoo (vc 17: TQ2883) on the LNHS Botany Section meeting hosted by Sven Seiffert on 28 August (*LNHS Newsletter* No. 223: 17).

Ian Woodward recorded *Pulmonaria longifolia* **narrow-leaved lungwort** as a garden escape in Highams Park (vc 18: TQ3992) on 23 March.

Clive and Helen Schofield recorded *Symphytum caucasicum* **Caucasian comfrey** from a car park near the Royal Botanic Gardens, Kew (vc 17: TQ182772) on 25 April.

Solanaceae

Atropa belladonna **deadly nightshade** was recorded as being 'not uncommon' during the LNHS Botany Section meeting (*LNHS Newsletter* No. 222: 14) led by Mary Smith on 18 June to Purfleet (vc 18: TQ5478); John Latham also recorded it from waste ground in Brentford (vc 21: TQ1777).

Stuart Cole, Pippa Hyde and George Hounsome visited Home Park, Hampton Court on 17 August and recorded *Datura inoxia* **downy thorn-apple** (vc 21).

A thriving colony of *Solanum chenopodioides* **tall nightshade** was reported by Brian Wurzell from the bed and margins of the lake at Victoria Park, Hackney (vc 21: TQ355834). Seedlings and young flowering plants of *Solanum laciniatum* **kangaroo apple** were found in flowerbeds, near their parents, at Mount Street Gardens (vc 21: TQ2880) on the LNHS Botany Section meeting led by myself on 13 August in Mayfair.

Veronicaceae

Tom Crace recorded six plants of *Kickxia elatine* **sharped-leaved fluellin** in an Ealing garden (vc 21: TQ177809) on 15 July.

Veronica montana **wood speedwell** and *V. chamaedrys* **germander speedwell** were both recorded from Whitewebbs Wood (vc 21: TQ3299) on the LNHS Botany Section meeting led by Robin Blades on 30 April to Whitewebbs Park (*LNHS Newsletter* No. 223: 10). Wood speedwell is now an uncommon plant in much of Middlesex and is largely restricted to ancient woodland habitats in the north and west of the vice-county; although commoner, germander speedwell may be declining and it is certainly worth noting specific locations in urbanized areas, particularly the inner London boroughs.

Plantaginaceae

Abundant *Plantago media* **hoary plantain** was recorded from a bank during the LNHS Botany Section meeting led by Mary Smith on 18 June to Purfleet (vc 18: TQ5478) (*LNHS Newsletter* No. 222: 14).

Lamiaceae

Chris Rose reported *Clinopodium ascendens* **common calamint** from four locations: adjacent to a retaining wall, Martens Grove Park (vc 16: TQ5027675357) on 7 April; just outside of Northumberland Heath Recreation Ground (vc 16: TQ4978377657) on 9 June; Northall Road, Barnehurst (vc 16: TQ5017576151) on 23 June and finally, from a shady track off Carlisle Lane, Lambeth (vc 17: TQ3086879407) on 23 July.

In my introduction to last year's report (Spencer 2011: 235–236) I reported Nick Bertrand's discovery of *Clinopodium calamintha* **lesser calamint** from Woolwich Stadium; sadly, our joy was not to last as the site was 'developed' for the 2012 Olympics, thus in this case one man's joy was another's calamity! Thankfully the well-known colony of this plant at Lesnes Abbey (vc 16: TQ 4777 7886) seems to be doing very well and on 29 May Ian Yarham reported that the 'original colony is thriving and extending down the hill'; he then went on to say that 'the really exciting find was an extensive spread of lesser calamint some twenty yards to the north [approximately centred on TQ47767888] of the original patch and separated from it by thick shrubbery and planted trees. The new colony is on a steeper slope and extends to about ten metres by five metres. It is so prolific in this area that it is almost impossible not to tread on it, but the fact that the slope is so steep and it is rather hidden away has clearly prevented it from being trampled and allowed it to thrive'.

Lamiastrum galeobdolon ssp. *montanum* **yellow archangel** was recorded next to the Cuffley Brook (vc 21: TQ326990) on the LNHS Botany Section meeting led by Robin Blades on 30 April to Whitewebbs Park (*LNHS Newsletter* No. 223: 11); this makes a nice change in Middlesex from the all-too-frequent invasive non-native subspecies *argentatum*.

Mentha requienii **Corsican mint** was recorded as new to Essex by Ken Adams and FSC students from 'goose-green' mud on the north side of Connaught Water, Epping Forest (vc 18: TQ4059) on 21 July (The Essex Field Club, Botany and Mycology Groups website: sourced 27 August 2012).

Salvia vebenacea ssp. *horminioides* **wild clary** was recorded in short turf (*LNHS Newsletter* No. 221: 16) on the LNHS Botany Section meeting to the Isle of Dogs near Mudshute Station (vc 21: TQ3779) led by John Swindells on 26 February.

Like lesser spearwort, *Stachys palustris* **marsh woundwort** is generally a common and widespread plant in the British Isles, not so in the urbanized parts of Greater London and particularly Middlesex although it remains frequent and locally abundant on the canals and rivers to the west of the vice-county. Marsh woundwort was found growing in the company of lesser spearwort by a pool (vc 21: TQ146929) on the LNHS Botany Section meeting led by David Bevan on 16 July to Harrow Weald Common and Bentley Priory (*LNHS Newsletter* No. 223: 12).

Paulowniaceae

Numerous saplings or regrowth of chopped down *Paulownia tomentosa* **foxglove-tree** (see Spencer 2008: 188–189) were recorded from the north-east section of London Zoo (vc 17: TQ2883) on the LNHS Botany Section meeting hosted by Sven Seiffert on 28 August (*LNHS Newsletter* No. 223: 16). Rosemary Etheridge also recorded saplings, quite some way from gardens, on Grim's Dyke in Pear Wood, Stanmore (vc 21: TQ172935). This plant does seem to be slowly gaining ground in the London Area and I have recently seen several semi-mature plants on railway embankments in west London; the only impediment to their spread seems to be severe winter cold or late spring frosts that damage the vulnerable flower buds.

Orobanchaceae

Melampyrum pratense **common cow-wheat** is now a very scarce plant in Greater London; Chris Rose found a ten-metre-square patch in Bexley Wood (vc 16: TQ4847273652) on 7 July. Common cow-wheat was one of the species I was intent on locating whilst doing the GLA Habitat Survey in the early years of the last decade and although I managed to locate it on a couple of occasions in the Oxleas Wood area I never found it at Bexley Wood; at the time, the site was very heavily trampled, perhaps things have improved?

A photograph of what turned out to be *Rhinanthus angustifolius* **greater yellow rattle** from Leaves Green, Saltbox Hill, Biggin Hill (vc 16: TQ4061) was submitted by a member of the public to the Natural History Museum's Information and Advisory Service based in the Angela Marmont Centre for UK Biodiversity; the plant was identified by Fred Rumsey who contacted Geoffrey Kitchener (BSBI vice-county recorder for Kent) who, in turn, commented that this was the first record for Kent. However, in Botanical records for 2006 (Burton 2007: 177), Burton notes that he has accepted a record by Elizabeth Norman from High Elms. Recently, Geoffrey Kitchener discussed the Saltbox Hill and other Kent records for the Kent Botany 2011 report (see Kent vcc webpage hosted by the BSBI). He also confirmed to me its presence at High Elms where he saw enormous quantities.

Campanulaceae

A small patch of *Campanula persicifolia* **peach-leaved bellflower** was recorded from a meadow at Warren Farm just south of Nonsuch Park (vc 17: TQ2362) during the LNHS Botany Section meeting on 25 June (*LNHS Newsletter* No. 222: 16). *Campanula rotundifolia* **harebell** is now a very scarce plant over much of Greater London; Chris Rose recorded approximately twenty-three plants from acid grassland on the east side of the cemetery, Christchurch, Bexleyheath (vc 16: TQ4883975524) on 7 September.

Asteraceae

Although considered an invasive species on the Continent (Spencer 2011: 247) *Ambrosia artemisiifolia* **ragweed** remains a plant of casual occurrence in the London Area and the UK as a whole; Ian Kitching found one plant at Worcester Park (vc 17: TQ222660) on 23 October.

In 2008, I reported (Spencer 2008: 178) on the occurrence of *Anthemis austriaca* **Austrian chamomile** in 'wildflower' seed mixes; since then records have been scant, but in 2011 Ian Kitching recorded it from a wide range of localities in Surrey, namely: Cheam Recreation ground (vc 17: TQ238640); Kimpton Park Way (vc 17: TQ247659); Sutton Common (vc 17: TQ251656); Merton Parks Green Walk (vc 17: TQ253697) and Sutton (vc 17: TQ252647 & TQ260642). The first three of these records were deliberately planted, the remainder were casuals.

Artemisia absinthium **wormwood** was recorded (*LNHS Newsletter* No. 221: 15) on the LNHS Botany Section meeting to the Isle of Dogs in Millwall Park (vc 21: TQ382785) led by John Swindells on 26 February. It was also found in Acton Park (vc 21: TQ2076780277) on 12 March during an LNHS Botany Section meeting. Wormwood is not common in Middlesex and any records of this plant are of interest.

Following up on the LNHS Botany Section meeting led by myself on 13 August in Mayfair, John Edgington discovered *Calendula arvensis* **field marigold** growing in the lawn at Mount Street Gardens (vc 21: TQ284805) on 5 September.

A single plant of *Crepis biennis* **rough hawksbeard** was recorded from the south-east section of London Zoo (vc 17: TQ2883) on the LNHS Botany Section meeting hosted by Sven Seiffert on 29 May (*LNHS Newsletter* No. 222: 10). This would appear to be either very rare in Middlesex or under-recorded; I suspect the former, as so far, I have only seen rough hawksbeard in south-east London. The same species was also recorded as abundant from a meadow at Warren Farm just south of Nonsuch Park (vc 17: TQ2362) during the LNHS Botany Section meeting on 25 June (*LNHS Newsletter* No. 222: 16) and Dave Dawson recorded it from Wimbledon (vc 17: TQ238715) on 3 May.

Cirsium arvense var. *vestitum* **creeping thistle** was recorded from the south-east section of London Zoo (vc 17: TQ2883) on the LNHS Botany Section meeting hosted by Sven Seiffert on 29 May (*LNHS Newsletter* No. 222: 10). Whilst out hunting for *Piptorus quercinus* **oak polypore** in Richmond Park on 17 July 2010 I found a somewhat odd thistle growing (vc 17: TQ18997175) amongst creeping thistle and *Cirsium palustre* **marsh thistle**. My first impressions swung between it being either a hybrid or *Carduus tenuiflorus* **slender thistle**; being in mycological mode, I hastily grabbed a specimen and headed off. The specimen then languished in a cupboard at the Natural History Museum until I was prompted by Ann Sankey (to whom I'd mentioned the possible discovery of *C. tenuiflorus*) to confirm my record; this time I properly examined the pappus hairs which confirmed the plant was a *Cirsium* (*Carduus* — simple hairs, *Cirsium* — branched/feathery ones), a quick check in the NHM's British and Irish Herbarium drew a very close match with material of *Cirsium* × *celakovskianum*, the hybrid between *C. arvense* and *C. palustre*. My tentative determination has subsequently been confirmed by the BSBI referee Kevin Walker.

A stand of *Echinops bannaticus* **blue globe-thistle** was recorded from the old tree nursery, Nonsuch Park (vc 17: TQ224632) during the LNHS Botany Section meeting on 25 June (*LNHS Newsletter* No. 222: 15); was it planted or an escape?

Whilst undertaking survey work, Tony Wileman recorded *Filago vulgaris* **common cudweed** on 20 July from an all-weather sports pitch at Mabey Green in Hackney (vc 21: TQ36618534). John Latham also recorded it during 2011, this time from The Butts, Brentford (vc 21: TQ1777).

In my last report (Spencer 2011: 248) I discussed the lack of recent records of *Galinsoga parviflora* **gallant-soldier** compared to *G. quadriradiata* **shaggy-**

soldier. Ian Kitching recorded gallant-soldier from several places in Surrey, helping to confirm the opinion of several local botanists that the plant remains frequent in that part of the London Area; why not elsewhere? Localities where Ian recorded gallant-soldier in 2011 include: The Wrythe, Carshalton (vc 17: TQ274655) on 24 August; New Malden (vc 17: TQ215681) on 28 August; Worcester Park (vc 17: TQ222660) on the following day and finally, Wimbledon Chase (vc 17: TQ249694) on 9 October. Dave Dawson also found it near Queenstown Road, Battersea (vc 17: TQ286762) on 20 September.

The non-native perennial subspecies of **nipplewort** *Lapsana communis* ssp. *intermedia* was recorded (*LNHS Newsletter* No. 221: 16) on the LNHS Botany Section meeting to the Isle of Dogs on Pier Street (vc 21: TQ384788) and Stebondale Road (TQ383786) led by John Swindells on 26 February (see also Spencer 2011: 248).

Onopordon acanthicum **cotton thistle** was recorded (vc 18: TQ5678) during the LNHS Botany Section meeting led by Mary Smith on 18 June to Purfleet (*LNHS Newsletter* No. 222: 15).

Senecio inaequidens **narrow-leaved ragwort** was recorded (*LNHS Newsletter* No. 221: 15) on the LNHS Botany Section meeting to the Isle of Dogs at the slipway adjacent to Invicta Wharf (vc 21: TQ386784) led by John Swindells on 26 February. This non-native plant is now frequent locally in this part of Greater London (Burton 2007: 176, Spencer 2008: 178).

In the LNHS 150th anniversary volume of *The London Naturalist* (Spencer 2009: 75) I passed comment on the likely origins of the Crayford Marsh population of *Sonchus palustris* **marsh sow-thistle**; sadly, it would now appear that the last truly wild plants of this species from the inner Thames have now been extirpated and the plant has not been seen for at least five years despite repeated searches. Luckily, sensing all was not well, during 2004 I retrieved seed from some of the few remaining flowering stems and have been propagating plants, first at Camley Street Natural Park and more recently in the Wildlife Garden at the Natural History Museum (with the aid of Caroline Ware and volunteers). Most importantly, Chris Rose came to my aid and has provided additional propagating space as well as helping locate a new home for the plants; thus, on 27 May, Chris, Adrienne Basey and I planted a group of about ten young plants at Thames Road Wetland (vc 16: TQ5288775272). This location is within 600 metres of the last known occurrence near the pathway running alongside the River Cray just before it joins the Darent (vc 16: TQ532756). Since then several plants died but some are thriving and have flowered well and with the assistance of Karen Sutton another population is being established at Crossness, and between us, Chris and I have approximately 250 young plants of marsh sow-thistle to plant out in the area over the next year or so.

The introduced *Tragopogon pratensis* ssp. *pratensis* and the native ssp. *minor* **goat's-beards** were present and available for comparison at the old tree nursery, Nonsuch Park (vc 17: TQ224632) during the LNHS Botany Section meeting on 25 June (*LNHS Newsletter* No. 222: 15).

Caprifoliaceae

Leycesteria formosa **Himalayan honeysuckle**, see the entry for *Cotoneaster wardii*, **Rosaceae**.

Apiaceae

Berula erecta **lesser water-parsnip** was recorded from the balancing pool, Nonsuch Park (vc 17: TQ226636) during the LNHS Botany Section meeting on 25 June (*LNHS Newsletter* No. 222: 15–16). Although quite common in some less-urbanized parts of London this species is often under-recorded and confused with *Apium nodiflorum* **fool's-parsley** when not in flower, checking for the basal septum on the petiole should help resolve any queries, although sometimes this is not clearly present.

I think Mary Smith's star turn for 2011 must be the discovery on 1 August of *Bupleurum tenuissimum* **slender hare's-ear** in Purfleet; the plants were located just west of the Queen Elizabeth II Bridge 'on finely broken rubble and gravel, about 3 m from Thames edge' (vc 18: TQ56997685). As Mary pointed out in her e-mail to me, this is the first record from South Essex within the LNHS boundary of this species and mirrors its discovery near the River Darent flood barrage in Crayford (Spencer 2010: 119). Mary also kindly deposited vouchers at the Natural History Museum.

The very surprising discovery of *Hydrocotyle vulgaris* **marsh pennywort** in a lawn at Mount Street Gardens (vc 21: TQ2880) was the highlight of the LNHS Botany Section meeting led by myself on 13 August in Mayfair. Several large patches of the plant were detected in the grass alongside *Trifolium micranthum* **slender trefoil**, *Leontodon saxatilis* **lesser hawksbit**, *Veronica montana* **wood speedwell** and *V. chamaedrys* **germander speedwell**. Marsh pennywort is now a rare plant in Middlesex, although it is tempting to view this colony as a miraculous survivor from the eighteenth-century urbanization of the area I'm more inclined to believe the plant has more recently colonized via fresh turf, but we will probably never know!

Sanicula europaea **sanicle** was recorded next to the Cuffley Brook (vc 21: TQ326990) on the LNHS Botany Section meeting led by Robin Blades on 30 April to Whitewebbs Park (*LNHS Newsletter* No. 223: 11). Chris Rose found a patch near the River Shuttle in Bexley Wood along the western edge of the canalized Danson inflow channel (vc 16: TQ4834173809) on 25 August; I saw the same colony whilst doing the GLA Habitat Survey in 2003.

Not far from the shrubby trio of Ward's cotoneaster, Himalayan honeysuckle and deutzia on the opposite side of the road, *Smyrnium olusatrum* **alexanders** and *Smyrnium perfoliatum* **perfoliate alexanders** were recorded naturalized in private gardens (vc 21: TQ245805) on the LNHS Botany Section meeting led by myself on 18 May (*LNHS Newsletter* No. 222: 18). Perfoliate alexanders was also recorded by Ian Kitching from Merton Park Green Walks LNR (vc 17: TQ252697) on 28 May.

On 7 June I visited Barley Mo Farm, Napsbury with David Bevan and Adrienne Basey to take a look at the populations of several rare arable weeds including *Torilis arvensis* **spreading hedge parsley**. Overall, we were quite concerned as several of the species seemed to have declined significantly since David's last visit on 11 July 2005; the only species that seemed to be thriving was *Centaurea cyanus* **cornflower**. Two target species, *Legousia hybrida* **Venus's-looking-glass** and *Viola tricolor* **wild pansy**, cound not be found. Of the remaining we counted a single *Papaver argemone* **prickly poppy**, a few *Papaver rhoeas* **common poppy**, plentiful *Arenaria leptoclados* **slender sandwort**, approximately 20–30 *Scleranthus annuus* **annual knawel** and over 200 *Torilis arvensis*. Most of these plants were located in a corner of the field that seemed to have escaped the chemical spray (vc 20: TL163028). David contacted Trevor James, the vice-county recorder, to explain the worrying situation, he in turn has spoken to the relevant authorities and a positive outcome seems to have been agreed.

Numerous plants of *Torilis nodosa* **knotted hedge-parsley** were recorded in mown grass and nearby flowerbeds (*LNHS Newsletter* No. 221: 16) on the LNHS Botany Section meeting to the Isle of Dogs on Jubilee Crescent (vc 21: TQ383790) and at Burrell's Wharf (TQ374783) led by John Swindells on 26 February. This species was also recorded in abundance during the LNHS Botany Section meeting led by Mary Smith on 18 June to Purfleet (vc 18: TQ5478) (*LNHS Newsletter* No. 222: 14). Chris Rose made seventeen records for knotted hedge-parsley during 2011 confirming that the plant remains locally abundant in SE London, particularly Erith, Crayford, Bexleyheath, Slade Green, Bexley, Blackfen, Eltham and Lambeth. Dave Dawson made three further records from the Battersea area (vc 17: TQ28687707, TQ286763 and TQ284767) where it is probably less frequent.

MONOCOTYLEDONS

Alismataceae

Sagittaria sagittifolia **arrowhead** was recorded from the northern end of Summerhouse Lake in Bentley Priory Nature Reserve (vc 21: TQ154928) on the LNHS Botany Section meeting led by David Bevan on 16 July to Harrow Weald Common and Bentley Priory (*LNHS Newsletter* No. 223: 13). I suspect it has been planted some time in the past at this site as it is normally a plant of slow-moving rivers and canals. The very similar non-native *Saggitaria latifolia* **duck-potato** was recorded from the balancing pool, Nonsuch Park (vc 17: TQ226636) during the LNHS Botany Section meeting on 25 June (*LNHS Newsletter* No. 222: 15). All *Sagittaria* plants in ponds, particularly in Surrey where duck-potato seems to be more widely established, should be checked and comparison made between *S. latifolia* (yellow anthers, petals without purple basal blotch) and *S. sagittifolia* (purple anthers, petals *usually* with purple basal blotch).

Potamogetonaceae

Kate Mitchell reported *Potamogeton crispus* **curled pondweed** from Clapton Common Pond, Hackney (vc 21: TQ34168764); Aaron Woods also recorded it from Waterloo Park, Highgate (vc 21: TQ285871) on 9 July, and Becca O'Shea reported 'lots of it' from the 'slacker, siltier' reaches of Mayes Brook, Mayesbrook Park, Barking (vc 18: TQ4608384685) in June. Tim Harrison recorded a thriving population of *Potamogeton perfoliatus* **perfoliate pondweed** in the Slough Branch of the Grand Union Canal (vc 21: TQ049807), just inside the vice-county boundary. Stuart Cole, Pippa Hyde and George Hounsome visited Home Park, Hampton Court on 17 August and recorded *Potamogeton pusillus* **lesser pondweed** from The Long Water (vc 21: TQ1568). Dave Miller did some recording at Crossness (vc 16) in 2011 and recorded *Potamogeton trichoides* **hair-like pondweed** as well as *Berula erecta, Juncus gerardi, Lepidium latifolium, Puccinellia fasciculata, Ranunculus baudotii, Ranunculus sardous, Rumex maritimus, Schoenoplectus tabernaemontani* and *Torilis nodosa.*

Orchidaceae

Anacamptis pyramidalis **pyramidal orchid** was recorded from a meadow at Warren Farm just south of Nonsuch Park (vc 17: TQ2362) during the LNHS

Botany Section meeting on 25 June (*LNHS Newsletter* No. 222: 16). Chris Rose recorded a single plant from Bexleyheath, not far from the junction with Watling Street (vc 16: TQ4970075196) on 24 June.

A single, late flowering, *Dactylorhiza fuchsia* **common spotted-orchid** was found growing near a pool (vc 21: TQ146929) on the LNHS Botany Section meeting led by David Bevan on 16 July to Harrow Weald Common and Bentley Priory (*LNHS Newsletter* No. 223: 12).

On 15 December, a single plant of *Epipactis helleborine* **broad-leaved helleborine** was recorded by Richard Bullock in the south-east corner of the London Wetland Centre. It was situated in young woodland planted in 1997. The thriving, well-known colony on the Hampstead Heath Extension (vc 21: TQ263872) was observed by Aaron Woods on 16 July; I suspect this is the largest colony in Middlesex outside of the Harefield area. Ian Kitching found two plants at Perrett's Field, Sutton (vc 17: TQ245642) on 23 July, and finally, Chris Rose found a plant on the fence of Birbeck Primary School, Faraday Avenue, Sidcup (vc 16: TQ4650972538) on 28 September.

Middlesex's pioneer *Himantoglossum hircinum* **lizard orchid** produced two flower spikes in 2011, partially due to the helpful hand of dedicated folk giving it a water during the early spring drought (see Spencer 2010: 126).

Four plants of *Ophrys apifera* **bee orchid** were found in the lawn of Abbotsleigh Mews Nursing Home, Old Farm Road East (vc 16: TQ460729) by David Nicolle where he had seen it for two years.

Alliaceae

Allium neapolitanum **Neapolitan garlic** was recorded by Ian Kitching on two occasions: first, from the Pyl Brook pathway, Sutton (vc 17: TQ245657) on 6 March, and secondly, from Merton Abbey Mills (vc 17: TQ2669) on 2 May. On 25 April, Clive and Helen Schofield found *Allium paradoxum* **few-flowered garlic** in the conservation area at Kew Gardens (vc 17: TQ178765), not too far from the well-known site at St Anne's Church (see Spencer 2010: 124). *Allium subhirsutum* **hairy garlic** was recorded in a neglected shrubbery (*LNHS Newsletter* No. 221: 16) on the LNHS Botany Section meeting to the Isle of Dogs on Spindrift Avenue (vc 21: TQ3778) led by John Swindells on 26 February. Ian Kitching also recorded it from Beddington (vc 17: TQ296650) on 5 March. *Allium ursinum* **ramsons** was recorded next to the Cuffley Brook (vc 21: TQ326990) on the LNHS Botany Section meeting led by Robin Blades on 30 April to Whitewebbs Park (*LNHS Newsletter* No. 223: 11) and by Clive and Helen from short grass in open woodland at the Royal Botanic Gardens, Kew (vc 17: TQ183765) on 25 April.

Nectaroscordium siculum **honey-garlic** was recorded from the south-east section of London Zoo (vc 17: TQ2883) on the LNHS Botany Section meeting hosted by Sven Seiffert on 29 May (*LNHS Newsletter* No. 222: 10–11). There are two subspecies of this plant present in the British Isles: ssp. *siculum* and ssp. *bulgaricum*; they are fairly readily discernible (tepal colour, perianth shape and pedicel length being important features) although intermediates occur (Stace 2010: 903).

Asparagaceae

Cordyline australis **cabbage palm** was recorded (*LNHS Newsletter* No. 221: 15) on the LNHS Botany Section meeting to the Isle of Dogs at the slipway adjacent to Invicta Wharf (vc 21: TQ386784) led by John Swindells on 26 February. This record for cabbage palm was particularly interesting as it is usually found as singletons in the London Area; at this location there were approximately ten plants of differing sizes; I suspect that fruit are being washed up on the slipway from the river having fallen from a plant that overhangs the water further upstream. A seedling of cabbage palm was also recorded during the LNHS Botany Section meeting to Wormholt Park (vc 21: TQ2280) on 10 April.

Ian Kitching recorded *Ornithogalum umbellatum* ssp. *campestre* **Star-of-Bethlehem** from Tolworth (vc 17: TQ202652) on 23 April as did Paul Bartlett from Ham Riverlands (vc 17: 1672) on 1 January. He also recorded *Ornithogalum umbellatum* sensu lato from New Maldon (vc 17: TQ200690) on 25 April; as did Chris Rose from Thames Road Wetland (vc 16: TQ 52867 75246) on 19 April.

Ruscus aculeatus **butcher's-broom** was recorded from the southern edge of Whitewebbs Wood (vc 21: TQ325992) on the LNHS Botany Section meeting led by Robin Blades on 30 April to Whitewebbs Park (*LNHS Newsletter* No. 223: 11).

Arecaceae

A single seedling of *Trachycarpus fortunei* **Chusan palm** was recorded from the Woodland Walk section of London Zoo (vc 17: TQ2883) on the LNHS Botany Section meeting hosted by Sven Seiffert on 28 August (*LNHS Newsletter* No. 223: 16; see also Spencer 2011: 250).

Cyperaceae

Rather stunted plants of *C. divulsa* ssp. *divulsa* **grey sedge** were recorded adjacent to the lake made by the damming of Cuffley Brook (vc 21: TQ3299) on the LNHS Botany Section meeting led by Robin Blades on 30 April to Whitewebbs Park (*LNHS Newsletter* No. 223: 11). On 27 June, Chris Rose, Adrienne Basey and I recorded *Carex pseudocyperus* **cyperus sedge** from Thames Road Wetland, Crayford (vc 16: TQ5278275243). Later in the year, on 7 July, Chris recorded cyperus sedge from the banks of the River Shuttle in Marlborough Park, Blackfen (vc 16: TQ4640773488). Chris suggested to me that the plants may have 'come in with planted material during [a] river restoration scheme'. Ian Kitching reported an almost certainly planted colony at Three Kings Piece, Mitcham (vc 17: TQ281687) on 30 May, and on 25 June, a single, small plant was recorded from the balancing pool, Nonsuch Park (vc 17: TQ228637) during the LNHS Botany Section meeting (*LNHS Newsletter* No. 222: 16).

In my Botany report for 2007 (Spencer 2008: 181) I mentioned the spread of *Cyperus eragrostis* **pale galingale** along the Regent's Canal, since when it has continued to spread and is now of sufficient concern that it has been listed an invasive non-native species by the London Invasive Species Initiative (LISI). Apart from the Regent's Canal this species is so far normally recorded as singletons or small colonies; Chris Rose recorded it from two locations in Bexley: from the banks of the River Shuttle, Marlborough Park, Blackfen (vc 16: TQ4640773488) on 25 August; a lawn on Erith Road, Bexleyheath (vc 16: TQ4969375288) on 16 September, and from a flower bed, again on Erith Road, Bexleyheath (vc 16: TQ4968075276) on 28 September. I would very much appreciate further records of this plant.

I was very delighted at our rediscovery of *Scirpus sylvaticus* **wood club-rush** in a small pond in Whitewebbs Wood (vc 21: TQ3299) on the LNHS Botany Section meeting led by Robin Blades on 30 April to Whitewebbs Park (*LNHS Newsletter* No. 223: 10). According to Kent and Lousley (1955: 288) it was first recorded from Whitewebbs in 1948 by Mrs L. M. P. Small. Aside from the large thriving colony at Kenwood, Hampstead Heath, I am not aware of any other extant sites in Middlesex; localities to check include Ruislip Lido (Reservoir), Bushy Park (Queen's River) and Hampton Court Park, Shortwood Common, the River Brent at Hanwell and Perivale and Hadley Common. On 9 July, Aaron Woods recorded wood club-rush from Hampstead No.1 Pond, Hampstead Heath (vc 21: TQ272858) where he thinks it may have been planted; this location was not recorded on the 2007 *Flora of Hampstead Heath* cd-rom produced by the LNHS.

Poaceae

A single plant of *Aira caryophyllea* **silver hair-grass** was growing in a flower bed in St John's (vc 21: TQ246806) on the LNHS Botany Section meeting led by myself on 14 May (*LNHS Newsletter* No. 222: 8); as George Hounsome says in his report, this plant seems decidedly uncommon in much of the London Area, particularly Middlesex.

Anemanthele lessoniana (previously known as *Stipa arundinacea*) **pheasant's-tail** (or **New Zealand wind-grass)** was recorded from the north-east section of London Zoo (vc 17: TQ2883) on the LNHS Botany Section meeting hosted by Sven Seiffert on 28 August (*LNHS Newsletter* No. 223: 16).

Ceratochloa carinata **California brome** was recorded just north of the Causeway (vc 17: TQ232712) on the LNHS Botany Section meeting led by Dave Dawson on 27 March to Wimbledon Common (*LNHS Newsletter* No. 221: 17). This species was also recorded on the LNHS Botany Section meeting to the Isle of Dogs on the Thames Path (vc 21: TQ383784) led by John Swindells on 26 February.

Nassella tenuissima (previously known as *Stipa tenuissima*) **Argentine needle-grass** (not 'American' as I incorrectly wrote in my last report, Spencer 2011: 251) was recorded from the north-east section of London Zoo (vc 17: TQ2883) on the LNHS Botany Section meeting hosted by Sven Seiffert on 28 August (*LNHS Newsletter* No. 223: 16). Ian Kitching also recorded this plant, this time from Sutton (vc 17: TQ249648), on 25 August.

As I mentioned in my last report (Spencer 2011: 251–252), *Poa infirma* **early meadow-grass** is locally abundant in parts of north and east London (particular Islington and Haringey) but still appears to be infrequent elsewhere in Greater London. Large quantities were recorded from the southern portion of Acton Park (vc 21: TQ2080) on 12 March and from the south-east edge of Wormholt Park, Shepherd's Bush (vc 21: TQ2280) on 10 April during the LNHS section meetings, significantly expanding the westward edge of its known range in Middlesex.

Another scoop for Mary Smith was the first record in Essex of *Rostraria cristata* **Mediterranean hair-grass**. Mary found this on 10 August in an industrial estate south-west of Aveley (vc 18: TQ55067962). The colony consisted of a 'patch of about 200 plants in roadstone chips between two large industrial buildings and much concrete'. After having the plant identified by Ken Adams (Essex vice-county recorder), Mary deposited vouchers at the Natural History Museum.

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Survey of Bookham Common

SEVENTIETH YEAR

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Introduction (Stuart Cole, Chairman, Bookham Common Survey)

This was another busy year at the Common. The National Trust, under direction of ranger Ian Swinney, furthered its work of thinning parts of the mature oak woodland to diversify habitats. In addition, some of the scrub on the plain was removed to extend the area of open pasture which is more limited now than in the past. This was helped once again by grazing cattle on the plains through the summer.

The Trust's activities at Bookham were used as examples of good practice in a woodland management day for National Trust and Surrey Wildlife Trust staff that was held in October. Ken Willmott talked about the precise conditions required by some of Bookham's most notable woodland butterfly species. It was appreciated how much work Ian Swinney and his team of volunteers have put into trying to maximize biodiversity through habitat management and he explained the value of the LNHS Bookham Common Survey to The National Trust in planning the management of the Common's habitats.

The Bookham Common Survey was the subject of a short BBC Radio 4 programme which was one of a series of five on British natural history societies. For this Ian Swinney and I were interviewed by Brett Westwood of the BBC's Natural History Unit in July and the programme was broadcast in September 2011.

Bookham was also used by the Entomology Department of the Natural History Museum to trial the American-designed Lindgrün beetle trap. In April, LNHS member Max Barclay, who heads the Coleoptera and Hemiptera Section at the museum, along with other museum staff suspended four of the traps in mature oak and pine trees at the edge of clearings in the woodland. These were left in the trees and checked at intervals until October when they were removed. Originally intended to catch bark beetles in plantations, and baited with an attractant designed for Scolytinae, the Lindgrün traps proved very effective in catching a wide range of beetles and other insects without any bait. It will take some time to identify the large number of species but already discovered in the catch are some previously unrecorded beetle species for the Common and others not found there for decades. One of the most interesting of these is the large staphylinid beetle *Villeius dilitatus*, a scavenger in hornet nests, of which five were caught. This has never been recorded before at Bookham and could be an example of how an apparently rare species may well turn out to be not so uncommon.

Two insect study days were held: butterflies and Odonata in July led by Neil Anderson and Orthoptera led by Sarah Barnes in August. In addition there was the ever-popular fungus foray led by Ray Tantram in October.

Birds (Alan D. Prowse)

The most important happening in 2011 was the successful nesting of common buzzards for the first time. A pair has been in residence for several years, and had built an incomplete nest two years ago, but this year three or four young fledged successfully. There are other pairs, probably four or five, in the surrounding woods. There were several pairs of sparrowhawks and two pairs of kestrels on the Common. For the second year running a hobby could be seen patrolling the main ponds, presumably for Odonata. Several single red kites were recorded during the year.

The cleared, enlarged, and restored easternmost pond resulted in the breeding of a little grebe pair, and a pair of Canada geese nested on the island there. A pair of tufted ducks was present on the pond system again this year, though no young were seen, and a pair of mute swans was unsuccessful. Coots nested on four of the five main ponds. Nearby the grey herons had twenty-four nests in occupation.

Three pairs of lesser whitethroats held territory. Willow warblers had ten territories, the best figure for about a decade, and they were on Central, Bayfield, Isle of Wight, and Western Plains. Chiffchaffs, blackcaps, and garden warblers were present on the plains in good numbers. There were at least thirty-four territories of common whitethroats on the plains with others elsewhere, an extremely high number for the Common. One male cuckoo persisted for some weeks. Nightingales had seven territories, and did not prepare us for the high total to come in 2012.

Ring-necked parakeets now appear regularly on the Common, and a group is regular near the hotel on the southwestern edge. Display is seen, but no family groups, though they breed in the area.

There have been some changes in the finch populations. As the scrub has been reduced on the plains, the bullfinch has become confined to the denser areas. These areas, for the nightingales and garden warblers, are still covering a fair acreage but there is a mild reduction in the bullfinch population. In contrast the greenfinch is now breeding over the whole of the plains in good numbers, having been confined to surrounding gardens in the mid 1990s. The goldfinch also has a greater presence than before. Hawfinches were recorded in small numbers behind Bookham Station at both ends of the year.

Vegetation (Steve Mellor)

Carrying out monad recording for the forthcoming LNHS and Surrey Botanical Society floras, we have seen as many as sixty migrations of taxa into new Divisions across the recording area of Bookham Common. However, finding new taxa there has been more of a problem. Failing to make new discoveries in our usual nose-to-the-ground attitude, we have been looking to the heavens for inspiration and, recording there, four tree species have been found, remembered, or verified for first appearances on the taxa list for the Common.

Several small white willow *Salix alba* saplings appeared in the flooded marshy area in Division N at the inlet to Isle of White Pond. There have been previous unverified records of this species and not having the expertise among the present botanical group, Barry Phillips was able to verify the taxon for us.

Three alien trees have also been found: (1) A few Norway spruce *Picea abies* have seeded from gardens into division J along the eastern boundary of the Common. A previous record of this taxon on the western boundary was surely a planted Christmas tree that became too large to be retrieved by the inhabitants of the cottages along Maddox Lane. (2) A more interesting tree is a small Indian horse-chestnut *Aesculus indica* that appeared in woods along Broadway South in division M, long suspected and finally verified by its winter buds and bronze springtime foliage. (3) Two walnut *Juglans regia* are more worrying, recently seen in scrub at the edge of The Arboretum in Division S, but with protective planter tubes. To date no one has admitted to the planting, but this taxon can establish itself very readily in suitable habitats, and cut trees will readily regrow. We will need to watch closely lest it becomes another alien pest tree on the Common to join Turkey oak *Quercus cerris*, sycamore *Acer pseudoplatanus* and Norway maple *Acer platanoides*.

I return now to the perennial tree fungus, robust bracket *Phellinus robustus*, first recorded in Surrey on Bookham Common, growing on an oak in Division F and described previously in the report for 2009 (*LN* **89**: 82, Fig. 2). It is sad to relate that someone has thought fit to remove the *P. robustus* from its tree and presumably from the Common. Although we cannot be certain that it was someone on one of our fungus forays that returned to remove it, losses of plants and over-collection of fungi are not uncommon after open meetings. I believe that the practice of widely advertising natural history meetings for example on the Internet is one that should be given careful consideration when rare populations of plants and fungi, especially edible fungi, are to be visited.

Invertebrate Field Study Day, 9 July 2011 (Neil Anderson)

At least twenty-five people turned up for this annual general insect study day and it was good to see some new faces as well as familiar friends. The weather was suboptimal with sunshine at a premium and cloud building as the day progressed.

Fifteen species of butterfly were recorded. As with previous years there were good numbers (*c.* fifteen) of silver-washed fritillaries seen and a pair was observed coupled in flight, landing on the top of a tall hawthorn where copulation continued. Five white admirals were noted and as it was wholly overcast by the time we reached the traditional lek I wasn't over-optimistic about seeing a purple emperor. We were lucky as we did have one brief flight from one male here.

As in 2010, a single marbled white was discovered, a species that does seem to be expanding around the London area. Just a single speckled wood was recorded — perhaps a legacy of the hot, dry spring, though other sites seem to have reasonable numbers. This was a good year for red admirals — we saw at least six individuals.

Moths encountered while we explored included six-spot burnets, shaded broad-bar, common wainscot, the migrant silver-Y and a couple of cinnabar larvae.

The most noticeable thing about the Odonata was the paucity of them. The Isle of Wight Pond yielded singletons of emperor, broad-bodied chaser and ruddy darter. Another emperor was hunting in a glade as was a female southern hawker. Damselfly numbers were also low. It was pleasing to have excellent views of a male beautiful demoiselle perched on vegetation close to Merritt's Cottage, confirming a continued presence at Bookham.

Turning over a log close to Merritt's Cottage revealed a large carabid which Stuart Cole confirmed was a violet ground beetle *Carabus violaceus*, and only the second record for the Common. Other frequently seen beetles at Bookham such as *Chrysolina herbacea* and *C. polita* near the Isle of Wight Pond were shown to the group. An unusual observation by Stuart and photographed by

Tristan Bantock was an attempted mating by a soldier beetle *Rhagonycha fulva* on the longhorn beetle *Rutpela maculata*!

More notable avian records included a calling buzzard, a hunting hobby and most significant up to twenty crossbills calling as they flew low over a glade.

This was an excellent day for herps with six species recorded. Four great crested newts were found below a large stone and several recent metamorphs of both common frog and common toad were seen. Up to ten common lizards from yearlings to large adults were seen basking on logs, whereas a couple of colourful hatchlings and an adult slow worm were found under logs. Two yearlings (again below a log) and an adult grass snake completed this excellent list.

Additional field notes (Stuart Cole)

9 April. A new beetle species for Bookham, the rare red longhorn *Pyrrhidium sanguinum* was found by Tristan Bantock under bark on a log pile near the station. Another beetle found today was a female of the anthribid *Platystomos albinus* under a piece of board. Although I have not seen the species here before it has been recorded at the Common a couple of times previously. Many of the harlequin ladybird *Harmonia axyridis* were present in the window of the hut where they had probably been overwintering. A beetle that is often found in small numbers in the hut is the little melyrid *Anthocomus fasciatus*, its presence there something of a mystery.

14 May. Tristan Bantock recorded two further new beetle species for the Common, both Notable: *Melandrya caraboides* (Nb) and the weevil *Rhinocyllus conicus* (Na). The weevil *Coeliodes transversealbofasciatus* was another Nb species he recorded. Among other beetles were the longhorns *Phymatodes testaceus* and *Alosternus tabacicolor* and five species of *Cantharis*: *C. rustica*, *C. nigricans*, *C. decipiens*, *C. lateralis* and *C. livida*. Also, swept by NHM staff, was one of the rare scarlet malachite beetle *Malachius aeneus*.

11 June. The small longhorn beetle *Phytoecia cylindrica* was found on low vegetation by Merritt's Cottage, the dung beetle *Onthophagus fracticornis* was picked up by the Isle of Wight car park, *Harmonia axyridis* continues to be numerous, and among other beetles were *Cantharis nigrita*, *Oedemera lurida* and *nobilis* on hogweed, *Tomoxia bucephala* and the snail-eating ground beetle *Cychrus caraboides*. The large green mint leafbeetle *Chrysolina herbacea* is still reliably found in numbers on water mint by Isle of Wight Pond and one female was found mating with a male of *Chrysolina polita*. Among butterflies seen were speckled woods, purple hairstreak, the first white admiral of the year, and a small tortoiseshell which was a welcome sight now that it is no longer the common insect that it was until a few years ago.

1 July. On the first of three visits to the Common this month I found two males of the odd-looking tachinid fly *Phasia hemiptera* (Figure 1) on hogweed flowers. It has a somewhat short, wide body with broad multicoloured wings. It is parasitic and lays eggs on Hemiptera. In fact this was quite a good year for tachinids at Bookham: *Gymnosoma rotundatum* (Figure 2) and *Nowickia ferox* (Figure 3) were present on hogweed along with other species. *Gymnosoma* is another parasite on Hemiptera while *Nowickia* preys on noctuid moths. Two individuals of the honeysuckle sawfly *Zaraea fasciata* (Figure 4) were among other insects on hogweed. A couple of silver-washed fritillaries were the first that I saw at Bookham this year.

7 July. A remarkable thirty or more of the shiny black-and-red tenebrionid beetle *Diaperis boleti* were tapped out of a single birch bracket fungus. The reed

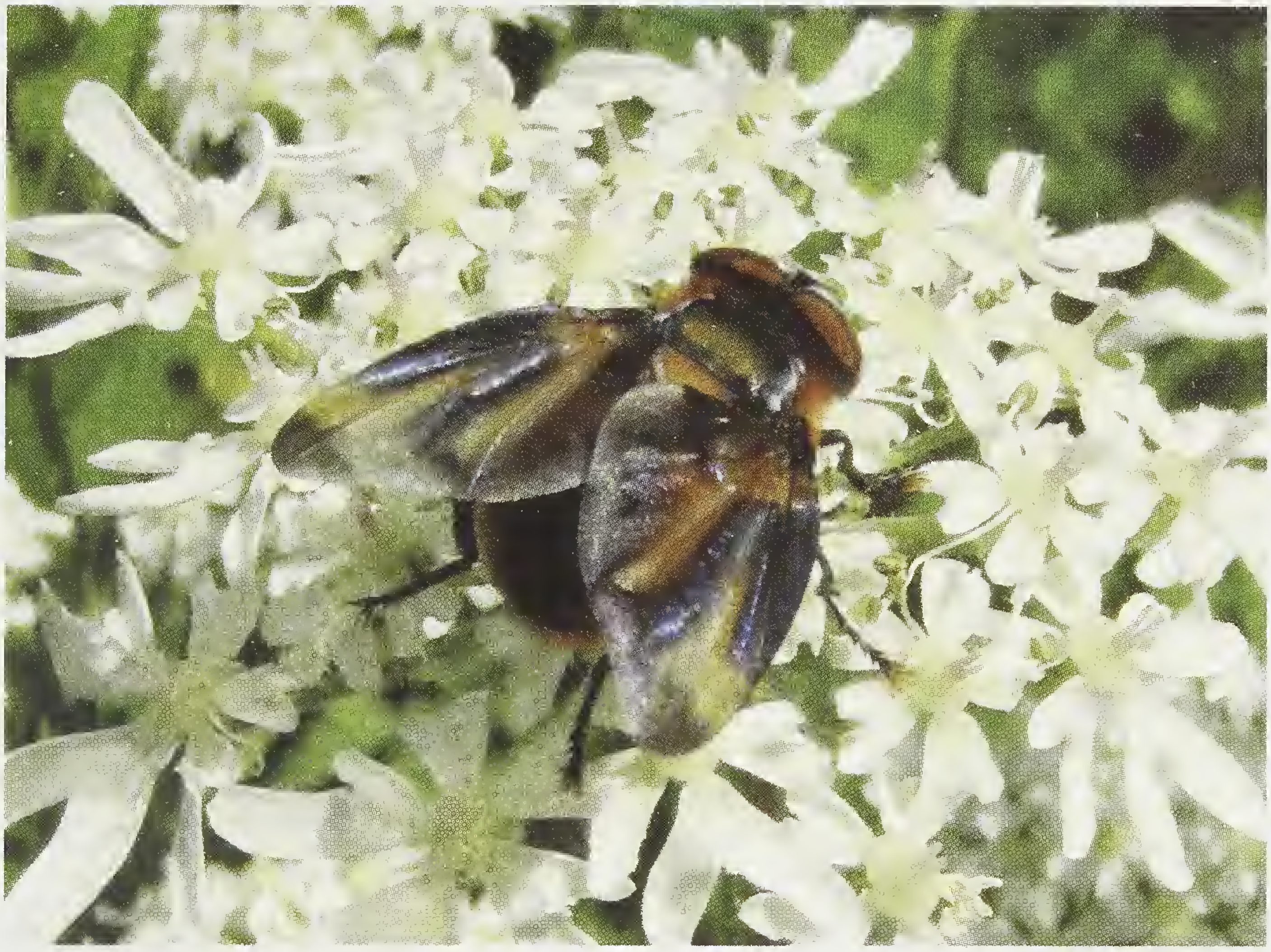

FIGURE 1. The tachinid fly *Phasia hemiptera* on hogweed, Bookham Common, 1 July 2011. *Photo: Stuart Cole*

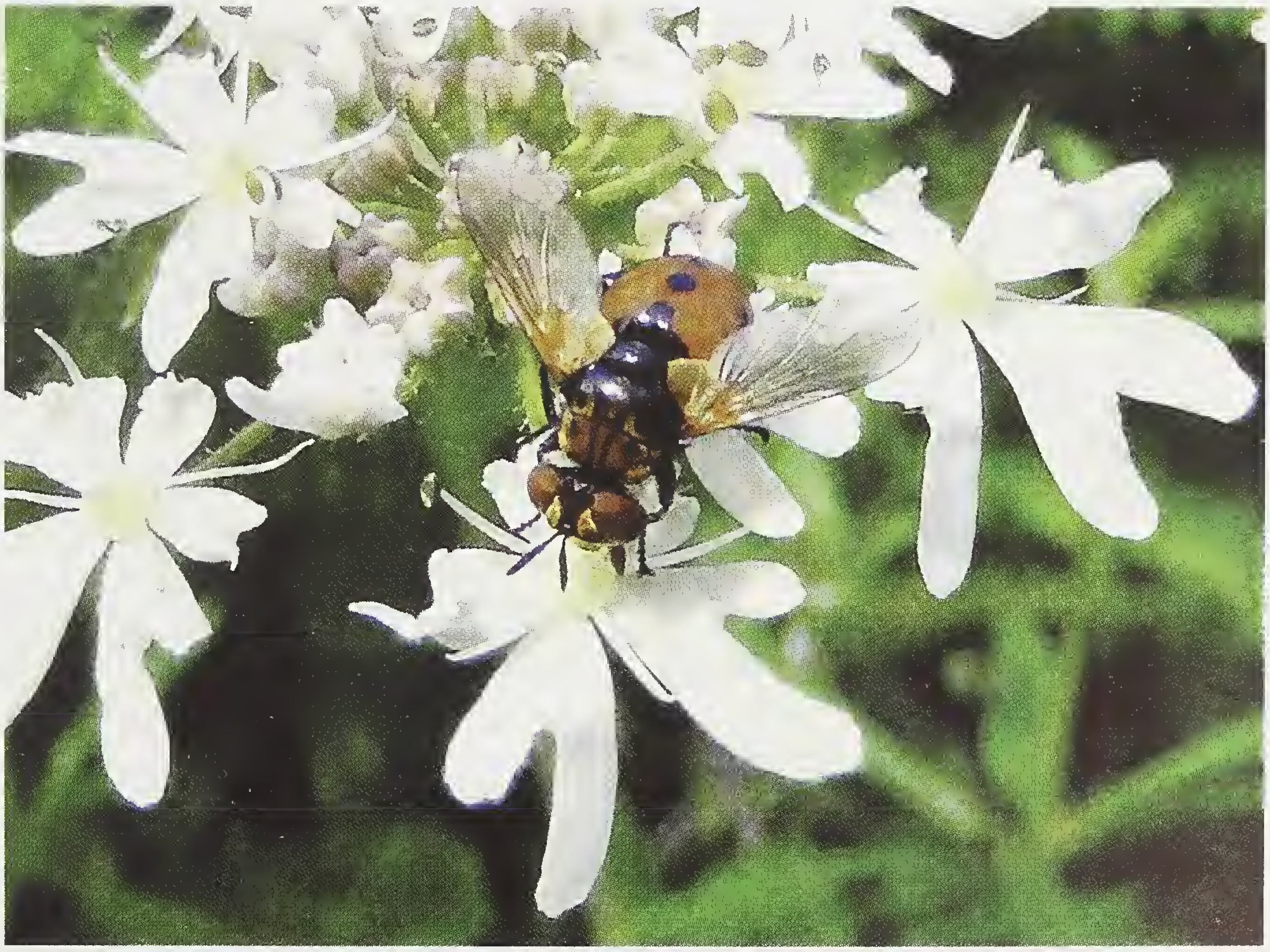

FIGURE 2. The tachinid fly *Gymnosoma rotundatum* on hogweed, Bookham Common, 7 July 2011. *Photo: Stuart Cole*

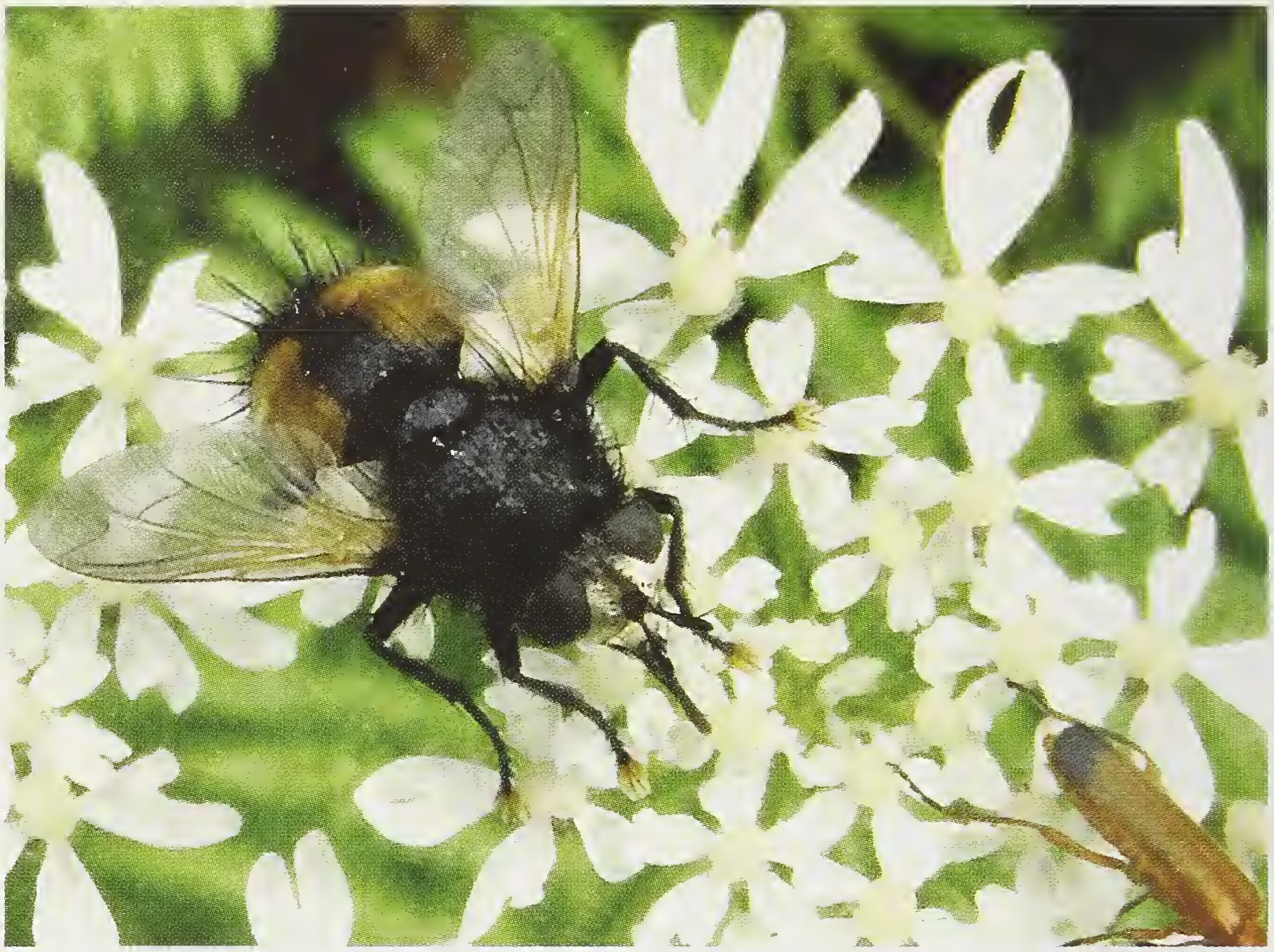

FIGURE 3. The tachinid fly *Nowickia ferox* on hogweed, Bookham Common, 7 July 2011. *Photo: Stuart Cole*

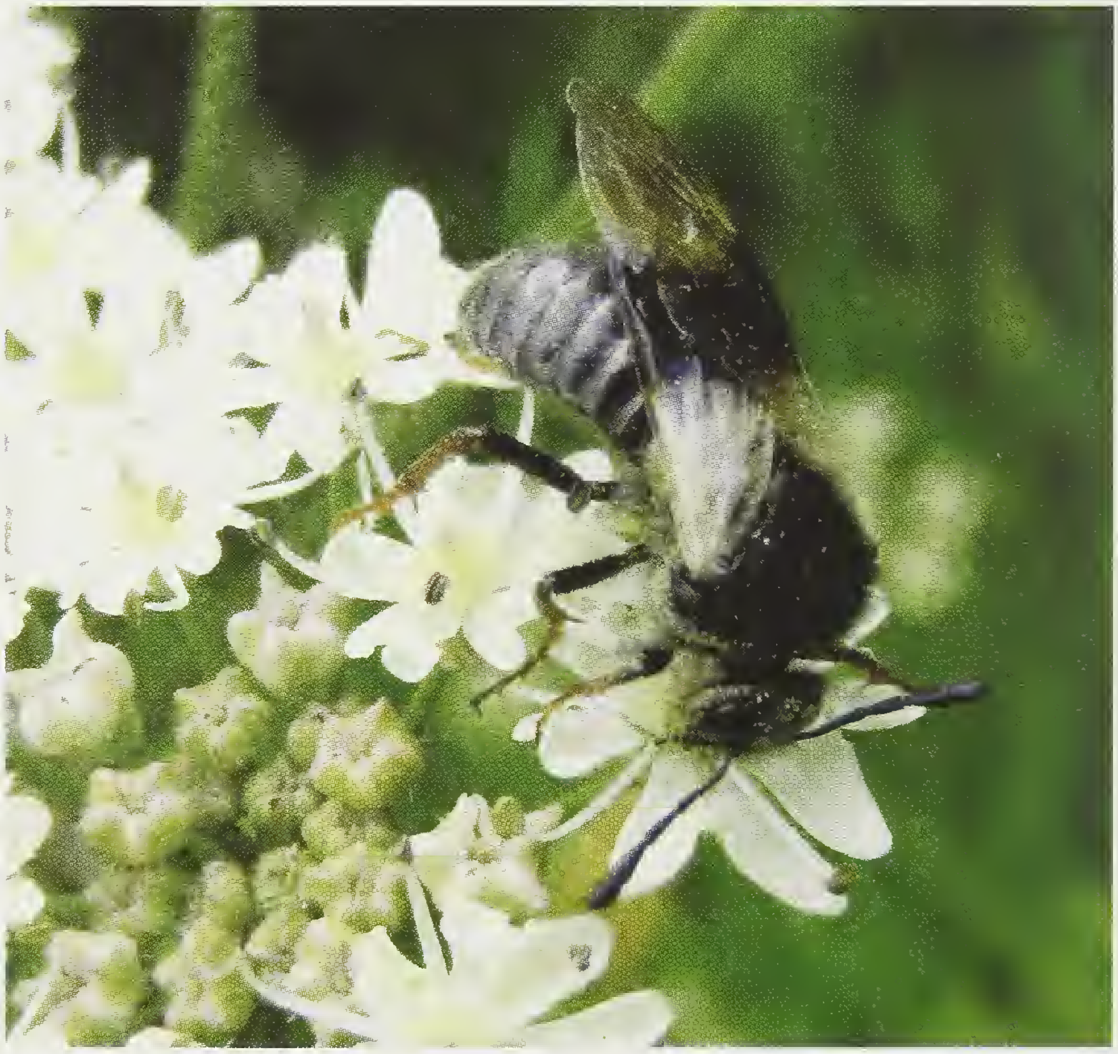

FIGURE 4. The honeysuckle sawfly *Zaraea fasciata* on hogweed, Bookham Common, 7 July 2011. *Photo: Stuart Cole*

beetle *Donacia marginalis* was present on bur-reed, the species' first record for Bookham.

13 August. Paul Wheeler had set up two light traps last night as he wanted to fill the gap in the year when he missed trapping in August in 2010. It was not an ideal night as it was a full moon but partially overcast. Among the fair number of moths in the traps were the curious looking *Acleris emargana*, a tortricid with deeply indented forewings, the attractive green carpet *Colostygia pectinataria*, several black arches *Lymantria monacha*, iron prominent *Notodonta dromedarius*, the diamond-back moth *Plutella xylostella*, and a little micro of the Yponomeutidae that is a migrant despite its small size. Also in the traps were a couple of hornets, two *Curculio* weevils, about a dozen of the little carabid *Bradycellus harpalinus* and a couple of caddis flies.

The highlight among the forty species of Hemiptera recorded by Tristan was the bright red-and-black *Corizus hyoscimi* on fleabane, a rhopalid formerly confined in Britain to the south and west coast of England.

One of the handsome longhorn beetle *Leptura quadrifasciata* was on hogweed flowers, and the find that most pleased us, a female brown hairstreak *Thecla betulae* that Billy Dykes saw nectaring on fleabane. It was a pristine specimen of a butterfly that is very localized in Britain and declining in Europe. Bookham seems to be a good site for this species. The eggs were sometimes found by Ian Menzies on blackthorn *Prunus spinosus* in early spring, and adults are occasionally seen, though this was my first.

10 September. Another female brown hairstreak appeared, this one a little worn, settled on a bramble leaf next to a fruiting blackthorn so perhaps about to oviposit. We looked for strawberry spiders *Araneus alsine* without success in the species' traditional haunt in the birch tree glade. I think the vegetation here, especially bracken, is now too high and dense here for the spider's liking. However it remains present at Bookham as it has been found in another location since. A dead magpie, the corpse almost stripped of flesh, yielded four of the carrion beetle *Nicrophorus vespilloides* (easily identifiable as the only red-and-black species of the genus with all-black clubs to the antennae), *Dermestes murinus,* and a few smaller beetles. A few shieldbugs were found in the glade today: *Picrimerus bidens*, some *Palomena prasina* nymphs, a *Troilus luridus* nymph, *Elasmucha grisea* and *Eurygaster testudinaria.*

On the way back to the hut three roe deer passed before us across the track, and from the hut we saw a peregrine falcon pass close by several times. Apparently it was present the day before. Also seen in the vicinity were a buzzard and a sparrowhawk.

Finally, Alison Fure has informed me that Surrey Bat Group have recorded the following bat species on Bookham Common: Bechstein's bat *Myotis bechsteinii*, noctule *Nyctalus noctula*, common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *P. pygmaeus* and brown long-eared bat *Plecotus auritus*. Alison has found evidence of hazel dormice nesting in two of the mammal boxes as well as two pygmy shrews in boxes that had been used by blue tits. Two further boxes had evidence of weasel predation, the victims being blue tits.

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Book review

Insects of Britain and Western Europe. A Domino Guide. Michael Chinery. Ed. 3, revised. 2012. Bloomsbury. 320 pp. Paperback £16.99. Over 2,300 illustrations. ISBN: 978 1 40817 948 2.

When a field guide to insects goes through three editions and six reprints it is safe to assume it is a winner. This is the familiar field guide that can always be found being carried by one or more members on LNHS field trips. We tend to use the codes 'in Chinery' or 'not in Chinery' to describe a key character of any insect under discussion. I own both of the previous two editions so was delighted to have the opportunity of reviewing this new 2012 edition, and no doubt I'll buy this one too. I cannot remember exactly who recommended me to buy the first edition, probably Neil Anderson, but my heavily thumbed copy is testament to it being my companion on field trips over many years, and now much of it is committed to memory. The new edition is a revision rather than a complete new edition, evidenced by it still weighing in at 320 pages.

The first edition was published in 1986. It was successful because it was concise, authoritative, beautifully written, well illustrated, just the right size, and with an uncanny knack of picking the insects most likely to be seen. Since then there have been several very good field guides covering ladybirds, bumblebees, moths, butterflies, Orthoptera, Odonata and other groups, and this book does not compete directly with them. If a prospective book purchaser is interested in only a single group of insects, then they are better served with one of these specialist guides as this book can only cover a subset. As a result, care must be taken in relying on 'Chinery' for identification: one of his classic phrases is 'there are many similar species'.

There are also several photoguides now available, including one by the same author, the *Collins Complete Guide to British Insects*. Some people prefer photoguides, but the illustrations in this book are generally hard to beat, and the concise text is without parallel. Chinery's companion volume, *Collins Field Guide to the Insects of Britain and Northern Europe,* is less well illustrated, but contains more text and very useful keys. It is still in print and well worth getting hold of.

The third edition benefits from the addition of several 'new' species including the horse chestnut leaf miner, Asian hornet and harlequin ladybird. Covering Britain and Western Europe means that many species likely to become established in Britain are already covered. The text has been comprehensively updated to reflect the current status and distribution of many species that have expanded or contracted their ranges. A few scientific names are out of date, but that goes for any field guide. As for any publication by this author, the recommendation is a definite 'buy', but shop around as prices vary — even the publisher offers a discount.

Mick Massie

Obituary

Photograph taken outside the Society's hut, Bookham Common, 9 October 2004, courtesy of John Edgington.

ERIC WILLIAM GROVES, 1923–2012

Although Eric Groves was a botanist by profession, he will best be remembered in the London Natural History Society for his in-depth survey of the Hemiptera-Heteroptera of the London Area, for his involvement in the City bomb-sites survey and for his participation in our Survey of Bookham Common.

Eric's family was from Dorset but he was born in Sutton, Surrey on 13 August 1923 and was educated at Sutton County School where he did particularly well in biology. Our late president Brad Ashby (obituary, *LN* **73**, 1994) attended the same school. After leaving school in 1939 Eric worked on charts for the Admiralty. During the Second World War he joined the Home Guard, but in 1942 he enlisted in the Royal Navy at Chatham where he trained as a sick-berth attendant, subsequently serving in the Indian Ocean theatre of operations, based firstly in Mombasa, then the Maldives and later Ceylon (now Sri Lanka). The flora and fauna of these warmer regions almost certainly influenced his later interests.

Eric Groves joined the Botany Department of the British Museum (Natural History) on 1 November 1946. At this time the Museum had barely started the enormous task of rebuilding following the Second World War bombing. Most of the herbarium was housed on the top floor of the main Waterhouse building, in both the east and west wings, and it was these parts of the Museum especially that were badly damaged by incendiary bombs, and were among the last and most difficult parts to be rebuilt, not being completed until 1962. One of Eric's early tasks was the repair and reconstruction of the many herbarium sheets damaged by fire and water. He was engaged on this over a period of twelve years. The damage was particularly bad to some of the monocot families. Almost unbelievably, some centuries-dormant seeds had germinated as a result of the water and ensuing dampness. Another of Eric's early tasks was working on the material acquired by Sir Hans Sloane (1660–1753), whose collections formed the nucleus of the British Museum in 1753. In the 1950s and '60s, Eric was one of a small number of Museum staff who travelled to the Arctic with the British Schools Exploring Society, and in the 1970s he taught evening classes at Goldsmiths College, where some of our members were attendees.

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Eric's interests were wide, covering several disciplines of natural history, particularly entomology, and he was a Fellow of the Royal Entomological Society when his work on the Hemiptera-Heteroptera of the London Area first appeared in *The London Naturalist* **43** (1964). This in-depth study ran to sixteen parts and 402 pages, ending in *LN* **65** in 1986. Eric had joined the LNHS in 1950 and throughout his membership he served on several committees. His first post was ten years on the Nature Conservation Committee which he joined in 1950 as Surrey representative. In just two years he had completed his report on nature conservation in Surrey based on information from fifty-seven contributors and amounting to over sixty pages of close typing and accompanied by a one-inch-to-the-mile map of the county, coloured to show the boundaries of each of the thirty-three recommended areas. Copies of this report were forwarded to The Nature Conservancy.

Among other posts on the Society's committees held by Eric were Entomology Committee Recording Secretary, representative on the Royal Entomological Society Protection Committee from 1957 to 1961, and committee member of the Ecology Section from 1956 to 1959, whilst for many years he served on the Bookham Common Survey Committee, actively contributing to the Survey as well as publishing a number of individual articles, listed at the end of this tribute. His only published article resulting from his participation in the Society's City bomb-sites survey is 'Some entomological records from the Cripplegate bombed sites, City of London', in *LN* **38**: 25–29 (1959).

Eric was a longstanding member, and sometime council member, of the South London Botanical Institute, having joined in 1957. He particularly enjoyed their field excursions to the Surrey hills. He recalled in an August 2005 interview with Petra Broddle meeting W. R. Sherrin, a bryologist working in the Museum and curator of the SLBI, who persuaded him to join in on the Institute's Saturday afternoon field meetings. In those days Museum staff worked Saturday mornings.

Like most botantists, Eric had horticultural interests and for many years he made an extensive study of the commercial cultivation of lavender and peppermint in the Mitcham and Carshalton areas. His research notes are now housed in the RHS Library at Wisley.

With his early naval experience and interest in natural history it was to be expected that Eric would have been interested in eighteenth-century expeditions to the Pacific and Indian Oceans. As luck would have it, and for historical reasons, the plant collections from many of these expeditions are housed at the Museum and therefore available for study. As a result he developed an interest in the 1768–1771 voyage of Captain James Cook and the 1790s voyage of Captain George Vancouver.

In 1981, Eric published in the Museum's *Bulletin* a substantial report on 'Vascular plant collections from the Tristan da Cunha group of islands'.

At the AGM of The Society for the History of Natural History, held in Shrewsbury on 26 April 2002, Eric Groves, David T. Moore and the late T. G. Vallance (Australia) were awarded the prestigious Thackray Medal of the SHNH in recognition of the publication in 2001 of their meticulously edited and copiously annotated work, *Nature's Investigator — the diary of Robert Brown in Australia, 1801–1805.* Brown sailed with Captain Matthew Flinders around Australia and in four years gathered more than 3,500 different plants, some 2,000 of which were new to science. David Moore and Eric spent nineteen years (Prof. Tom Vallance died in 1993) trying to match Brown's collections with entries in his voyage diary which had never been published.

Robert Brown later became the first Keeper of Botany at the British Museum in Bloomsbury. He was a remarkable man: he ran the department for thirty-one years with only a single helper (J. J. Bennett), but, sadly, did not live to see the transfer to the new British Museum (Natural History) at South Kensington in 1881.

Eric retired from the Museum in 1984 and subsequently spent much of his time researching the career and collections of the Scottish-born naturalist Archibald Menzies (1754–1842) who had sailed as surgeon with Vancouver. As Eric became infirm, visits to the Museum became increasingly difficult and progress on his Menzies work suffered. Nevertheless, he published one paper on Menzies in the *Archives of Natural History* early in 2012, and two more Menzies papers are scheduled for publication in 2013. A large body of Eric's research materials covering all aspects of Menzies' botanical interests has been donated to the Royal Botanic Garden Edinburgh. This includes an important hand-written file of Eric's most recent work listing the whereabouts of Menzies' herbarium collections, including specimens from the Sandwich Islands (Hawaii) and North America.

Most of Eric's entomological and geological collections are now in the Natural History Museum. These include his main collection of British Hemiptera as well as other insects including beetles, and also two boxes of Hemiptera from Ron Payne (obituary, *LN* **90**, 2011).

I am most grateful to David Moore for providing me with some of the details in this tribute; I am also grateful similarly to Roger Booth, Petra Broddle, John Edgington, Mavis Pilbeam and Roy Vickery.

Eric Groves died in Purley, Surrey during the night of 23/24 June 2012 and his funeral service was held on 9 July at Croydon Crematorium. His ashes were subsequently interred at St Peter's Church, Woodmansterne. He is survived by his former wife and three sons and a daughter to whom we extend our sincere condolences.

KEITH H. HYATT

Eric Groves's published contributions to the Survey of Bookham Common

1957. Material used in a long-tailed tit's nest on Bookham Common, Surrey. *Lond. Nat.* **36**: 57–58.

1958. A bird's nest feeding site of the long-tailed field mouse. *Lond. Nat.* **37**: 65–66.

1959. A note on the heather and bracken on Eastern Plain, Bookham Common. *Lond. Nat.* **38**: 60–61.

1975. Vermes: Hirudinea: a further note on the medicinal leech. *Lond. Nat.* **54**: 45–46.

1991. A preliminary list of the Hemiptera-Homoptera (Auchenorhyncha) of Bookham Common, Surrey. *Lond. Nat.* **70**: 149–152.

1992. (with C. B. Ashby). A further bibliography of the natural history of Bookham Common, Surrey. *Lond. Nat.* **71**: 169–176.

Book review

Field guide to the micro moths of Great Britain and Ireland. Phil Sterling and Mark Parsons, illustrated by Richard Lewington. 416 pp., 215 × 137 mm, paperback, ISBN 978 0 9564902 1 6. British Wildlife Publishing, 2012. UK price £29.95 plus p.&p., from BWP, The Old Dairy, Milton on Stour, Dorset SP8 5PX.

There can be few who would disagree that there has long been a need for a single book dedicated to the identification of British micros. Many long-standing moth specialists have for several years bemoaned the fact that an absence of such a work is the prime reason why there are so few micro specialists compared to those who have an interest in the macros. The series *Moths and Butterflies of Great Britain and Ireland*, commenced by the Curwen Press, maintained by Harley Books and now in the hands of Apollo Books, began in 1976, is still not complete (Tortricoidea and Pyraloidea are absent), mostly out of date and in any case way beyond the financial reach of mere mortals; it is also debatable whether the plates in volume 1 are actually of any value. There are numerous books on selected micro families, mostly brilliant and almost all non-British, but nothing that can act as a British field guide to all families. Numerous Internet sites are available to help the ignorant to misidentify moths without any peer-interference; the need for a comprehensive guide on paper has never been greater.

We all know that the Introduction is the bit that most people do not read, but to skip this particular section would be a mistake and would almost certainly lead to incorrect identifications; it is a valuable source of information on the basics of studying and identifying micro moths. There are paragraphs on how to use the book correctly, including a well-illustrated glossary of the various parts of the moths that need to be examined, distribution, recording and how to look for the non-adult stages. A key to families, credited in the Acknowledgements to Martin Corley, is presented and illustrated with colour paintings of the moths or drawings of the relevant features. This useful feature is followed by an At-a-glance guide to micro moths, in which a representative of each family is depicted; this may have less value to most, given that all 1,033 included species are illustrated elsewhere.

Of course, the inclusion of 1,033 species means that some 500 – 600 species are not included. The authors recognize the likelihood that this will force the inexperienced to ‘shoehorn’ their moth into one of the illustrated species and claim to have deflected this by either omitting detailed coverage of some groups, such as *Parornix* or by providing identification to a group of species rather than a single taxon (e.g., within *Coleophora*). The Checklist of British species at the rear of the book may need to be consulted, of course, for the reader to know into which category a moth falls, but it is possible that some specimens may slip through this safety net. For example, under the genus *Bucculatrix* we are told that there are fourteen species, but only two are discussed and illustrated in spite of the fact that several missing species are just as distinctive as others that are included.

Regrettably, authority names are not given after the scientific binomials. They are included in the checklist of species (which is complete and so includes the 500 or so taxa not discussed) but, given that the book uses modern names and a modern sequence of species, this may present a few problems.

Some minor basic errors include the fact that Bob Heckford is incorrectly named on page twelve as the person responsible for the updating of distribution maps formerly held by the late Maitland Emmet; it is, of course, John Langmaid who is responsible for this. Bob holds copies, that may not necessarily be up to date and perhaps this explains the few anomalies that I have spotted in the distribution maps in relation to Hertfordshire (vc 20)? On the other hand, I am very pleased to see that Ireland is included in the maps. The key to families may be a tad confusing and I would have preferred, personally, a simple dichotomous key. The Index is based on genera, not the specific epithets. Given that a new nomenclature is used and that old genera are not also indexed this is unfortunate, since seasoned micro people will be unable to find their species whilst newcomers will not use it in any case! The flight periods of adult moths are given, but larval dates are not, which is particularly annoying given that many species are seldom found as adults.

In spite of the few niggles, this is a wonderful and much-needed book; another twenty pages of text and plates to include all the British species would have moved it into the ‘excellent’ category! Nevertheless it will certainly widen interest in the micros and serve as a stepping stone to more serious study — there is no doubt that this is set to become *the* standard text on micros for several years to come.

Colin W. Plant

Obituary

BRYAN RAYMOND RADCLIFFE, 1926–2012

Many of those who attended the Bookham Common Survey meetings of the LNHS over the last quarter century or so will have known Bryan Radcliffe. He was a dedicated botanical recorder who collected a sizeable group of friends and colleagues about him to help with the Survey of Bookham Common. Many of us have much to thank Bryan for, in encouraging our interest in botany and identifying for us the large number of plant species recorded there. We were greatly saddened to hear of his sudden death on 20 May 2012 aged 86. He joined the LNHS in 1968, and was secretary of the Bookham Common Survey from 1999 to 2005.

Bryan was born on 4 April 1926 at Southend and soon after moved with his family to Putney where he developed his passion for natural history, particularly botany. His education was disrupted by the Second World War, and he moved out of London with Wandsworth Technical College to Guildford, and was awarded an intermediate BSc in engineering before being called up for National Service. He joined an RAF parachute regiment just after the war, going to Israel with them in a peacekeeping role. Following this, he returned to his profession as engineer working for Kestners and other companies in the chemical engineering industry.

Work gave Bryan the opportunity to travel widely and he was able to investigate floras across the world. At home he was a keen gardener, and over the years built up a collection of garden-worthy *Geranium* species that travelled with him and his family every time they moved houses across Surrey and Sussex. A particular favourite was *Geranium manculatum*, an attractive American taxon that has been developed to offer a range of showy cultivars for gardeners. During his busy working and family life, Bryan still managed to find time to record the native flora for the LNHS. Towards the end of his working life, when the need of a good salary was abating, Bryan was able to use his botanical expertise in the sort of job he had always wanted. He worked as gardener in the walled garden at the historic Borde Hill Garden near Haywards Heath.

Bryan was not a member of the Surrey Botanical Society (SBS), but they and the LNHS have common interests and numerous records have been exchanged between the two groups. To date, the earliest records of Bryan's in the SBS database are for 1965; his particular interests were rare native species and established garden escapes. He was, for example, the first to record green hound's-tongue *Cynoglossum germanicum* at Teazle Wood in Leatherhead, one of the largest populations of this rare native species in Britain, and later to be found on Bookham Common. Bryan was a prolific and very reliable recorder of data collected between 1965 and 1976 for *The Flora of the London Area*, compiled by Rodney Burton (LNHS, 1983), and he also contributed records to Ted Lousley's 1976 *Flora of Surrey*. Sadly, in his late forties, Bryan suffered a heart attack and strokes that curtailed his mobility if not his enthusiasm for botany. About this time he began to take an interest in the Bookham Common Survey where progress is more sedate. He first contributed to the vegetation report in the Bookham Common Progress Report for 1977 in *The London Naturalist* **57**, and continued until the Report for 2005. He joined us on our monthly survey meetings on Bookham Common for a number of years following 2005, but walking became more difficult for him and in the end he was unable to join us on the botanical forays; he would remain at the LNHS hut with his pipe, books and botanical records. He finally called it a day and sensibly retired from the Bookham Common Survey to tend his immaculate garden in Redhill.

Bryan's *magnum opus* at Bookham Common was a joint effort with his long-time friend and colleague Ken Page (obituary, *LN* **87**, 2008). They decided it was time to update the earlier botanical survey reported by A. W. Jones in *The London Naturalist* **33** in 1954. With little help from others, they quickly got into their stride making a wide-ranging botanical survey across the twenty divisions that divide the recording area of the Common. Results were soon to be published in *LN* **60** in 1981. Twenty years later, when there was a larger botanical recording group, they repeated the exercise with greater thoroughness and published the results of their second survey in *LN* **82** in 2003. It is highly unlikely that any subsequent survey will be as thorough.

We extend our deepest sympathies to Diana and their three children, grandchildren and great-grandchildren. We share in their sad loss.

STEVE MELLOR

Obituary

PETER CHARLES HOLLAND, 1927–2012

Peter Holland was one of those people who always seemed to be to hand when a problem arose, and you could always rely on him giving you the right answer; or, if he couldn't help you at that moment, he would be phoning you back pretty soon! On one memorable occasion in the early 1990s, an administrative crisis arose without warning and Peter was the first to step in and offer his services.

Peter joined the London Natural History Society in 1957 and from 1960 to 1999 he held many committee or Society offices. He was mainly active in the Botany Section, serving as secretary, reading circle secretary, mapping scheme secretary, and curator, most of these posts between 1960 and 1980. He was also an elected member of Council from 1967 to 1970 and Society secretary from 1970 to 1973. On relinquishing the latter post he was made an honorary vice-president, which rather surprised him as he remarked that he thought that was normally for past presidents! However, Peter was president for 1977 and 1978. In 1980 he became membership secretary, and for the next nineteen years he single handedly operated at home the massive and noisy Addressograph machine, producing all the labels and envelopes for Society mailings — in those days a small team did our mail stuffing in our basement room at Imperial College.

Rodney Burton relates that although in his latter years of activity in the LNHS Peter was more interested in mycological matters, in the 1960s and 1970s he was also keenly interested in the 'higher' plants. Giving formal lectures was not Peter's style, but he came to his own at informal gatherings around a table. Particularly memorable was his demonstration of how he pressed plants: he had a set of small weights which he used when laying out large compound leaves, so that they should remain completely flat between drying papers. When it came to leaving specimens under constant and even pressure for their final drying, the hefty *Atlas of the British Flora,* published in

1962 and measuring about 33 × 27 cm, was ideal — no botanist should be without it! The geographical coverage of our *Flora of the London Area* would have been much more uneven without his numerous visits to the more-underworked parts of the area.

Peter Holland was born on 13 April 1927 in Surbiton, Surrey. As a youngster he suffered from poor health, and following a bout of measles his eyesight was badly affected.

During the Second World War, Peter and his brother Dennis were evacuated to Hawkhurst in Kent. After the war, Peter's eyesight precluded him from being called up for National Service, so, from 1945 to 1951 he was able to further his education, excelling in French, German and English. In 1951, he passed the preliminary examination of the Chartered Institute of Secretaries, and he also acquired a certificate from the Royal Society for the Encouragement of Arts, Manufactures and Commerce London.

Peter worked briefly in London before joining Guardian Royal Exchange in March 1957. He stayed there until retirement in April 1989, receiving promotion along the way, and becoming a head of department.

Away from the LNHS, Peter was for many years active with the South London Botanical Institute at Tulse Hill, having led their fungus forays from the early 1960s, and in 1968 he joined their Council on which he served for forty years. His association with the SLBI lasted over fifty years and since his retirement he regularly spent a day a week working in their herbarium. The appreciation of how much the SLBI valued Peter's presence resulted in their conferring on him honorary membership. A tribute to Peter, written by their chairman, Roy Vickery, appeared in the *SLBI Gazette* in August 2012.

Peter was also an active member of the British Mycological Society to the extent that due to his much-acknowledged enthusiasm for myxomycetes, which over the years resulted in him being so frequently acknowledged in publications on British myxomycetes, that he was awarded their Benefactors' Medal for outstanding services to the Society, a rare recognition for an amateur: most recipients of the medal are professional mycologists attached to universities or botanical institutions.

Whenever Peter attended our meetings at The Linnean Society he would stand up and ask for unwanted matchboxes for storing his specimens.

Peter was an early supporter of the series of urban fungus forays initiated by the LNHS in 1991, and that have continued to this day in Haringey every autumn. He introduced participants to the intricate world of mycology in which he was a recognised expert. The Society owes much to Peter for the success of these unique urban forays, both to his teaching skills and to the meticulous way in which he invariably compiled and circulated detailed species lists of the fungi seen each year.

Ted Tuddenham recalls how 'My first faltering steps in mycology were supported by Peter who, after Keith Thomas had left our area, carried on as expert identifier for the grand annual foray around the best sites of Haringey in autumn. Peter would quietly examine, name and record each specimen sotto voce, which I would then bark our fairground style to the crowd of forayers. This was the only practical way to get the message over to up to a hundred people. Each year as Peter grew a little frailer I had to take on more of the leadership role and also became under his tutelage more confident in my identifications. His lists of the species we found always came through to us in a week or two, after he had done more work on any difficult ones at home.

I presume this involved use of microscope and keys as he never carried any books in the field and disapproved of it when he saw us doing so. Peter's quiet mien, depth of expertise and solid reliability are characteristics which could inspire a new generation of mycologists and myxomycetologists, if there was one; but there isn't, so his passing brings the end of an era closer.'

Peter had a short spell in hospital in the autumn of 2009 and he returned home supported by a home care package. The following year he had a fall on the stairs of his flat in Clapham, which caused brain damage, resulting in his going into care, firstly in Kenley, Surrey, and then to Poole in Dorset to be nearer to his family.

Peter died in Poole on 19 February 2012. He was unmarried, but is survived by his sister-in-law Jean Holland and two nephews, to whom we extend our sincere condolences.

A service of thanksgiving for the life of Peter was held at Poole Crematorium on 12 March 2012, where Roy Vickery represented the London Natural History Society.

Peter's collection of myxomycetes, which included the material he collected during our survey of Buckingham Palace Garden from 1995 to 1997, has been donated to the Royal Botanic Gardens, Kew. It is housed in almost 8,000 matchboxes. Many of his books have gone to the South London Botanical Institute.

I am grateful to Jean Holland for biographical details and for the photograph included here, to David Bevan, Colin Bowlt, Rodney Burton, John Edgington, John Swindells, Ted Tuddenham and Mike West for reminiscences, and to Roy Vickery for allowing me to quote from his SLBI appreciation of Peter.

KEITH H. HYATT

Book review

Guide to freshwater invertebrates. Michael Dobson, Simon Pawley, Melanie Fletcher and Anne Powell. Freshwater Biological Association Scientific Publication No. 68. 2012. 216 pp., A5, hardback. ISBN 978 0 900386 80 0, ISSN 0376 1887. £33 plus p. & p. from the FBA, The Ferry Landing, Far Sawrey, Ambleside, Cumbria LA22 0LB. Tel. 01539 442468.

This extremely well produced, attractive and comprehensive book is the second general guide to freshwater invertebrates published by the FBA. The previous one, No. 67 in the series, *Guide to British freshwater macroinvertebrates for biotic assessment,* we reviewed last year (*LN* **90**: 186).

In addition to the families covered in No. 67, this volume covers other freshwater organisms as well as giving extended coverage to many of the groups, often going beyond family level and providing extensive background information. The introduction covers classification, geographical scope, which includes Britain, Ireland and the Channel Islands, plus some species that occur in nearby mainland Europe, but not the Mediterranean region. Studying freshwater organisms covers collecting, preserving and storing, and the equipment needed for identification. How this book is arranged covers understanding the keys, the glossary — an eleven-page alphabetic dictionary of the terms used for the animals' anatomy, classification and habitats. After that, is the bulk of the book, thirteen sections of well-illustrated keys from flatworms, leeches, molluscs and crustaceans to eight keys covering the insect groups. Following the keys we are encouraged to take identification further, which includes additional study, recording and a bibliography. Next comes the classification of the groups covered, the glossary and index.

One especially good point is that the authors welcome comments and constructive criticisms from users, including via their website www.fba.org.uk

The book is dedicated to the memory of T. T. (Kit) Macan (1910–1984), one of the founding fathers of the study of freshwater biology. He was co-author with E. B. Worthington of the 1951 New Naturalist *Life in lakes and rivers,* as well as being the author of several FBA titles, including on water boatmen in 1939, their first Scientific Publication.

K. H. Hyatt

Obituary

COMMANDER JOHN MARTIN WILLIAMSON TOPP,
OBE, RN, FLS, 1937–2011

John Topp was born on 28 June 1937 and died on 15 March 2011. He was the son of a naval officer and joined the Royal Navy in 1955, serving for thirty-four years.

John joined the London Natural History Society in 1979. He served on the Society's Council from 1994 to 1997 and was field meetings secretary for the Botany Section from 1991 until 1996 (between David Bevan and George Hounsome). Field meetings seem to have been his speciality as he also served on the Meetings Committee of the Botanical Society of the British Isles (BSBI) for around twenty years. He clearly enjoyed being in the field and his experience of field meetings and sympathy for the beginner show through in a wry and witty piece he wrote for *BSBI News* No. 64 (September 1993) entitled 'A guide to field meetingship'. He was elected a Fellow of the Linnean Society in January 1998.

As well as living in London, John had a home on Ibiza where over several decades he welcomed visiting naturalists interested in the island's flora. His own interest in natural history extended to the islands of the Indian Ocean and it was for services to the environment and conservation in the British Indian Ocean Territory that he was awarded the OBE in 2003. He became interested in the natural history of the Indian Ocean islands, and indeed the ocean itself, while serving as British Representative at the U.S. Military Base on Diego Garcia in the Chagos Archipelago (1984–1986). He played a significant part in campaigning for the conservation of the islands and the sea around them and only a year or so before his death was encouraging many of us to write to the British government in support of the establishment of the Chagos Marine Reserve. This was designated in April 2010 as a no-take Marine Protected Area — the largest marine reserve in the world. John was the founder of the Chagos Conservation Trust and edited their newsletter *Chagos News* from Issue 3 (July

1994) to Issue 32 (September 2008). He also wrote or contributed to a number of other publications on the flora and fauna of the Chagos, some of which are listed below.

I didn't know John very well but it seemed to me that he enjoyed life and entered with enthusiasm into any activity which he took on. I knew I was always in for a good conversation whenever we met and I can think of several occasions when I enjoyed his mischievous sense of humour. Talking with others who knew him I have learned that he was not just a good friend to many; he was a pro-active friend, seeking out how he could help in any way. He was good company and he enjoyed good company, and this is illustrated by one of John's bequests which was an index-linked sum to allow attendees at the BSBI's Welsh AGM to enjoy drinks at his expense! John was generous with his time and energy towards the causes he supported, and the LNHS is another organization to benefit from his will. Council is giving thought to a fitting way to apply his legacy.

I am grateful to fellow members of the LNHS's Botany Committee for their recollections of John and particularly to Simon Hughes, his long-time friend and former naval colleague, who provided me with additional information and supplied the photograph of John.

HAMILTON, M. and TOPP, J. 2009 (19 August). *British Indian Ocean Territory Plant Species Checklist* (PDF). Royal Botanic Gardens, Kew and Chagos Conservation Trust. http://www.reefnewmedia.co.uk/cmt_chagos/uploads/Chagos-Flora-Checklist_190809.pdf

SHEPPARD, C. and TOPP, J. 1999. *Birds of the Chagos. Natural history of the Chagos Archipelago* 4. London: Friends of the Chagos.

TOPP, J. M. W. 1988 (PDF). An Annotated Check List of the Flora of Diego Garcia, British Ocean Territory. *Atoll Research Bulletin.* **313**. Washington D.C.: Smithsonian Institution. http://www.zianet.com/tedmorris/dg/atoll_research_bulletin_313_flora_of_diego_garcia_1988.pdf

TOPP, J. and SEAWARD, M. 1999. *Plants of the Chagos. Natural history of the Chagos Archipelago* 3. London: Friends of the Chagos.

John Swindells

Book review

Collins complete guide to British coastal wildlife. A photographic guide to every common species. Paul Sterry and Andrew Cleave. Collins, London. 2012. 384 pp., colour illustrated. £17.99. ISBN 978 0 00 741385 0. Limp covers.

The book title and subtitle embrace a misleading oxymoron, in that 'complete' is to be taken as 'every common species' — so not complete at all. 'Coastal' here mostly excludes everything below low water, yet many subtidal fish are included. However, it is beautifully printed and bound, it stays open at the page selected, the text is readable, the photographs are almost entirely crystal clear, and I found no typos. It was printed and bound in China.

Some seventeen pages useful to a novice describe a variety of major habitats. Following this more than 350 pages describe maybe thousands of species across the plant, fungal and animal groups. It cannot be emphasized too much that identification from photographs is a perilous undertaking. Most of the photographs are excellent, but that misses the point. Seldom can a single photograph capture all the taxonomic characters necessary to identify a specimen of any but the most distinctive species. Thus on page 83 the albeit beautiful picture of tree-mallow flowers very nearly fails to illustrate a clinching character of the flower (that the sepals show through between the petal bases, not indicated in the text either). An artist can be instructed to include all necessary characters in the illustration of a species, and the best of them do. However, this is a 'photographic guide' so maybe this serious limitation is implicit and my criticism a little harsh.

The inter-tidal and supra-tidal biota are so diverse that few could confidently check every group the book covers, and nor could I. However, the long section (fifty-nine pages) on flowering plants includes a great many species not confined to coastal regions. Many might, therefore, have been omitted, clover, dandelion and nettle for example, giving more space to species that are so-confined, or making the book shorter.

Popular books encompassing species for which only scientific names are in use so often introduce at their own whim English names for the species, often with little justification and serving to confuse. Thus on page 35 the brown alga *Halidrys siliquosa* is called 'Sea Oak' (nothing to do with *Quercus*), a name used for a few decades in the eighteenth century and introduced by John Ellis (?1710–1768) for a species of intertidal hydroid, equally confusingly. 'Oaten Pipes' hydroid (p. 120), with the same origin, had a similarly brief use for another hydroid today referred to by scientists, divers and everyone else by its generic name *Tubularia*.

Hydroids come into the Cnidaria section, which is one of the few I can confidently comment on. I feel justified in being detailed here, since a reader of the book might expect that for a Collins book due checking by specialists would have been done. On the second line of the account of this group it is stated that cnidarians have 'stinging cells' (known as cnidae, most of these being termed nematocysts): but they do not all sting (some entangle, some others are sticky); and they are intracellular organelles, each being produced within a so-called cnidoblast 'mother cell' which **is** a cell. In the third paragraph there is the statement that in a typical cnidarian 'there are two stages in the life cycle'. Yet (justifiably ignoring the planula), this is true only of the advanced groups which typically have medusa stages. In most cnidarians, such as the more numerous anemones, corals and their allies, there is only the so-called polyp stage. 'Horseman Anemone' (p. 123) was a new one to me, and if I had heard just the English name I would not have had any idea what it was. Maybe I have missed recent literature, but I have known the species for fifty years. Until about 1940 the entirely dissimilar phylum Ctenophora, many species of which have a largely gelatinous body, were lumped under Cnidaria, but not since in scientific circles: but here (p. 126) no distinction is drawn, a zoological howler for seventy years.

I always feel it is unnecessary to include birds and mammals, let alone amphibians and reptiles (which are in no way marine!), in such a book, since especially the first two are covered by their own specialist books. However, as an ex-BTO ringer I have a few comments on the sixty-seven-page bird section. The photographs are as good as they might be, many even beautiful, yet my comments about the limitations of identification from photographs apply in full to this group with, in so many species, their varied plumage-states. That's partly why birds need a separate book. I applaud the inclusion of a juvenile shelduck (p. 316). How many, like me, were quite baffled by such a bird on first encounter? Yet many guides have omitted the juvenile. Is the twite on page 353 really a summer male? Maybe so, but the photograph doesn't show corresponding characters. I am more certain of saying that the wryneck, beautifully shown on page 354, is most certainly **not** a 'common coastal' species in any part of the UK!

Back to my own specialist group, on page 372 the hydroid species illustrated is, so far as I can tell, *Amphisbetia operculata,* not *Sertularia cupressina.* I showed the illustration to my wife, who exclaimed 'Why, even I know that!' — but she has walked quite a few shores with me. She also spotted on the same page that the specimen labelled *Thuiaria thuja,* a very distinctive species, is not that. It is in fact the morph known by some as *Sertularia argentea* auct., which after detailed study of literature and specimens from a range of places I considered (summary in Cornelius, 1995) possibly conspecific with *S. cupressina* s.str. However, I did like the idea of a strandline section and it could justifiably have been more than the eight pages allotted.

If I wished to buy a book of this size to identify UK intertidal species (excluding vascular plants and vertebrates higher than fish) I would buy a second-hand copy of Barrett and Yonge's (1958) still superb book despite its having dated. It represents the excellence of Collins' natural history publications of that era, and is still available on second-hand book websites at the time of writing for much less than the present book. It has shortcomings, but it was written and illustrated by experts and will still be useful to sixth-formers and above. The book under review will appeal to a more general audience, and probably not to committed naturalists except to those wishing to dabble briefly with the shore. In the groups that both books cover it includes fewer species, but is nonetheless a beautiful collection of photographs.

BARRETT, J. H. and YONGE, C. M. 1958. *Collins pocket guide to the sea shore.* Collins, London.

CORNELIUS, P. F. S. 1995. North-west European thecate hydroids and their medusae. Part 2. Sertulariidae to Campanulariidae. *Synopes Br. Fauna* (NS) **50** (Part 2): i–vii, 1–386.

PAUL CORNELIUS

Book review

Bird Sense. What it's like to be a bird. Tim Birkhead. 2012. Bloomsbury Publishing, London. xxii, 265 pp., illustrations by Katrina van Grouw. £16.99: hardback, ISBN 978 1 4088 2013 1, and e-Book 978 1 4088 2871 7.

This book is to be recommended. There is a clarity of purpose and lightly worn erudition that guides the reader quickly and entertainingly through the discovery and understanding of the current views of what it is like to be a bird. There are specific chapters on hearing, touch, taste, smell, magnetic sense and emotions, but recognition throughout that specific senses are rarely used in isolation.

Underlying this recognition is the history of research into bird senses and the uneven process that has occurred. For magnetic sense this lack of research is understandable as humans probably just lack a comparable magnetic sense, but for both touch and taste there has been little belief that birds had developed senses. The apparent hard beak being just so different from the human understanding. This is important more generally as the 'what it's like to be a bird' is difficult to make sense of both philosophically and scientifically. For how do you really understand birds when you start from the human use of senses and how then do you validate your experiments. The point is probably 'what it's like to be the world in which a bird is'.

Just to think of birds involves thinking about their visual abilities although we often forget their range is different as it includes UV frequencies. The sheer sharpness of a raptor's sight is actually due to the presence of two fovea at the back of each eye to provide two hotspots rather than the usual one in birds. The engaging story of how falconers trapped falcons by using a similarly sharp-eyed shrike does explain how the shrike survived: by dashing into a small protected cage at the last moment. A good mix of examples to prove the variety of visual abilities, but owls always seem to be the most intriguing of the bird species with their sheer precision of purpose.

Owls provide the link to the chapter on hearing. While the chapter on sight seems straightforward, this starts to change with the chapter on hearing and there is more and probably more recent information I had missed or perhaps just had not thought through properly. For instance, why do birds like bitterns not just go deaf from their booming? What is the point of alarm calls by small birds, as surely they just provide a helpful guide to the average sparrowhawk? A lot of answers are provided plus the realization that research into bird hearing may help us with research into human deafness and Alzheimer's disease. Returning to owls, I had not realized their ears were asymmetric to provide presumably more focus on the sounds of their prey.

For both touch and taste there is clearly much useful research still to be done. Partly this is because the two are often linked and the experimental process becomes complicated, and perhaps it is just difficult for us to comprehend that a wading bird probing the mud with its beak can develop a full three-dimensional map of the area being probed. The studies on kiwi skills are fascinating as will be the future studies on poisonous birds. So a very clear summary of the work so far and tantalizing hints for the future.

The discussion of the bird sense of smell is really intriguing, with excellent examples such as the odour seascape inhabited by albatrosses and petrels so they can track food and indeed navigate back home. This is supported by the build-up of scientific enquiry clashing with obvious but anecdotal evidence together with a realization that progress in other disciplines provides the impetus for standard theories to be retested. That said, my favourite detail remains that Union Oil deliberately increased the amount of mercaptan in the oil being piped as the rotting smell meant large numbers of vultures assembled wherever there were any leaks from the pipeline.

The chapter on magnetic sense provides an excellent quotation on understanding bird movements before the use of geolocators: 'using ringing recoveries to infer movement patterns of seabirds is a bit like trying to ascertain the summer holiday locations of British tourists from the police stations where their lost passports are handed in — crude at best and subject to all sorts of biases.' The author's affection for the guillemots he has studied for many years is clear as is his excitement on the new data that Skomer-raised guillemots will leave for the Bay of Biscay but then return for some months to the seas off north-west Scotland before back to the Bay of Biscay then back to Skomer. Precisely on the magnetic sense, studies show that the right eye is the essential point for study as it is this eye alone that matters. An early stage for some real studies.

Emotion is perhaps the most challenging chapter. Clearly the understanding of what emotions are in another species is difficult to understand and complicated to study and produce results that are accepted as properly scientific. The description of previously collaborative communities of guillemots falling apart into chaos and fighting once the sand eel population crashed is unnerving. Also, after chapters on the importance of touch and taste, the process of debeaking domestic chickens starts briefly to approach the ethical questions of longer-term pain and suffering.

My comments on emotion have not been uplifting but there are serious themes in this book which are developed by a comprehensive reference and source list. That said, the emotions chapter was also amusing and very readable on presumed affection and pair bonding in many bird species. I must stress the positive pleasure from reading this book which is a very good guide to how we understand what it is like to be a bird. There are of course still questions which seem puzzling just to approach let alone resolve. An obvious one is how flamingos can sense rain over such a distance so they know when to move. However, while there is much research to come the pathway will seem much clearer after reading and enjoying this book.

Michael Wilsdon

Book review

John Ray's Cambridge catalogue (1660). Translated and edited by P.H. Oswald and C.D. Preston. Ray Society, London. 2011. ix, 612 pp. Hardback, 240 × 165 mm. £75 (less to Ray Society members). ISBN 978 0903874 43 4.

Prof. Oliver Rackham in his foreword to this work reminds us that 'John Ray was, by any reasonable reckoning, one of the six greatest scientists that Cambridge has produced and probably the greatest scholar that Cambridge has ever sacked. He is remembered as Linnaeus's predecessor in the science of taxonomy, but he had not Linnaeus's gift for publicity. At the height of his international reputation the limit of his ambition was to retreat to his Essex birthplace where his father had been blacksmith, marry his sweetheart and live happily ever after, writing prodigious and learned Latin books on animals and plants from all over the world — which many read at the time but few have read since'.

The volume here reviewed is a translation of and commentary on John Ray's first published work which is recognized as the earliest flora of an English county, the first in a long and continuing line of such works. John Ray's *Catalogus Plantarum circa Cantabrigiam nasientum* was 'a small, anonymous, unpretentious, pocket-sized volume' (Baldwin 1986: 25). Nonetheless, the book was significant enough for Charles Raven, Ray's biographer, to comment that 'Few books of such compass have contained so great a store of information and learning or exerted so great an influence upon the future; no book has so evidently initiated a new era in British botany' (Raven 1950: 81). *Catalogus,* the catalogue, was, like many of Ray's books, written in Latin making it inaccessible to those lacking a classical education, so Oswald and Preston have done us great service by this translation. They are not the first to attempt a translation of Ray's Cambridge catalogue but theirs is the most complete; Ewen and Prime (1975), for example, did not translate either of the later, separately published appendices or all the appendices within the original *Catalogus*.

The original *Catalogus* of 1660 consists of eight different parts: two preliminary sections, the main catalogue, and five appendices. In his Preface to the reader Ray explains how he became interested in botany and describes his efforts to learn the subject (there was no one in the University who could help him so he taught himself), he outlines his methodology and the arrangement of the book. The second section, the *Explicatio* . . . or Explanation of the names of authors quoted . . . is really a bibliography of sources that he cites. The main catalogue is the core of the book. It is an approximately alphabetical list of plant species seen by Ray in Cambridgeshire together with a few species recorded by earlier authors but not seen by Ray. A standard entry for a species starts with what Oswald and Preston call Ray's 'chosen name' in Latin followed by the source or sources of the name, then synonyms with their sources. One or more English names usually follow, then a statement of habitat and frequency in Cambridgeshire may be given and specific localities listed. Occasionally other notes in English are included. The appendices begin with an Index of English names followed by an Index of places which is a list of interesting places to visit. The next two are for brevity referred to as the Etymology and the Interpretation. The Etymology, translated as 'The meaning of certain names, or etymology', consists of an alphabetical list of names with notes to explain their meaning and possible derivation. The Interpretation discusses and defines general botanical terms with no particular reference to Cambridgeshire. For this he draws from a much wider range of sources than those mentioned in the earlier Explanation. Ray's original book concludes with an outline classification of plants for which the translated title is 'The more customary headings or divisions of plants'. Ray published an Appendix in 1663 and a second edition of the Appendix in 1685, each including additional material and corrections.

Now to what Oswald and Preston have done with this diverse material. They cover all the contents of the *Catalogus* and the two separately published appendices. Chapter one of their work is an Introduction; chapter two covers John Ray's life and work, and chapter three describes the *Catalogus*, its structure and its printing and publishing history. Chapter four is a series of biographical notes on some authors cited by Ray. For a librarian such as this reviewer, chapter five is of particular interest because here Oswald and Preston discuss the research facilities available to Ray, asking how many of his sources Ray (or his colleagues) might actually have seen and where they might have seen them. They discuss the public and private libraries (including his own) available to Ray and his contemporaries and decide that 'We know a remarkable amount about the books which Ray might have seen in Cambridge in the 1650s', adding, 'but our knowledge is very incomplete'. Chapter six explains the authors' approach to the identification of the plants Ray describes. Chapter seven contains a brief set of notes on the translation and editorial methods of Oswald and Preston.

Those seven chapters of introduction are followed by 367 pages of the translation itself which is accompanied by 1,968 footnotes that illustrate the thoroughness of the researches of Oswald and Preston.

Their work is completed with a gazetteer of localities mentioned in the *Catalogus* (with a map), a vocabulary (which 'is intended to provide explanations of the epithets used in Ray's chosen Latin names and in the synonyms from earlier literature in his main catalogue and in its two appendices'), a bibliography and an index. The whole is generously illustrated with facsimile reproductions of title pages and sample pages from the *Catalogus* and its subsequent Appendices and other relevant plates of contemporary, or near contemporary, manuscripts, maps, etc.

For anyone interested in the life and work of John Ray, the history of the study of flowering plants and ferns in Cambridgeshire or the development of botany in general in Britain, this is an essential source of reference.

BALDWIN, S.A. 1986. *John Ray (1627–1705), Essex naturalist: a summary of his life, work and scientific significance*. Baldwin's Books, Witham.

EWEN, A.H. and PRIME, C.T. 1975. *Ray's flora of Cambridgeshire (Catalogus Plantarum circa Cantabrigiam nascentium)*. Wheldon and Wesley, Hitchin.

RAVEN, C.E. 1950. *John Ray naturalist: his life and works*. Ed. 2. Cambridge University Press, Cambridge.

JOHN SWINDELLS

Details of membership of The Ray Society (Registered Charity No. 208082) may be obtained by writing to The Honorary Secretary, The Ray Society, c/o Natural History Museum, London SW7 5BD.

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The London Naturalist

Instructions to contributors

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Locality spellings should follow the latest editions of maps published by the Ordnance Survey. Capitalization should be kept to a minimum. Common names of animals and plants must begin with lower-case initials (except for proper nouns), and **only Latin names of genera and species should** be typed in italic. When both common and Latin names are given there should be no brackets or commas separating them. **Genus names should appear in full where first used within each paragraph.** When scientific names are taken from a standard work, which must be cited, authorities may be omitted. In descriptive matter numbers up to a hundred should be in words, except in a strictly numerical context. Dates should follow the logical sequence of day, month, year, i.e., 25 December 1971, but in lists may be as 25.xii.1971. Measurements should be in metric and follow the SI system (Système International d'Unités), with imperial equivalents in parentheses where appropriate. There should be no full point following Dr, Mr, Mrs, or St. Lists should be in systematic, alphabetic or numerical order. **Hyphens should not appear at the ends of lines** as the right-hand margins of manuscripts do not need to be justified: **turn off the hyphenation option. Tables and figure legends should be typed on separate sheets at the end of the text. Word-processed text should not use italic, bold or compressed typeface. Paragraphs should be indented. Sentences must not begin with numerals. Footnotes and endnotes should be avoided.**

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In text:

Meadows (1970: 80) or (Meadows 1970).

In references:

MEADOWS, B. S. 1970. Observations on the return of fishes to a polluted tributary of the River Thames 1964–9. *Lond. Nat.* **49:** 76–81.

MELLANBY, K. 1970. *Pesticides and pollution.* Ed.2. Collins, London.

WHITE, K. G. 1959. Dimsdale Hall moat, part II. *Trans. a. Rep. N. Staffs. Fld Club* **92:** 39–45.

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Distribution maps should be submitted in the form of a recording map with symbols in Indian ink and stencilled or by transfers. Solid dots are used to indicate contemporary or recent presence, circles for old records, and crosses (not pluses) for other information, such as introduced species. The caption should be written outside the frame of the map and will be set up by the printer. Scale bars must be included **within** the frame of the map.

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